

TOWN OF NEWBURGH, INDIANA

SANITARY SEWER DESIGN AND CONSTRUCTION STANDARDS



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SANITARY SEWER DESIGN AND CONSTRUCTION

STANDARDS

TOWN OF NEWBURGH, INDIANA

Town Council Members:

William F. Kavanaugh	-	President
Anne Rust Aurand	-	Member
Eric Ellsperman	-	Member
Alonzo Moore	-	Member
Shari Sherman	-	Member

Town Staff Members:

Cynthia Burger: Town Manager
Leon Key: Wastewater Superintendent

Rebecca Gentry: Clerk-Treasurer
Tom Bodkin: Legal Counsel

Consulting Engineers: Commonwealth Engineers, Inc.
Indianapolis, Evansville, Fort Wayne, Terra Haute

TOWN OF NEWBURGH, INDIANA

SANITARY SEWER

DESIGN AND CONSTRUCTION STANDARDS

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Prepared by Commonwealth Engineers, Inc.

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INTRODUCTION

SECTION 1
INTRODUCTION

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SECTION 1

INTRODUCTION

1.01 General

The Town of Newburgh is responsible for ensuring the proper installation of all facilities as part of sanitary sewers constructed in or connected to the existing Town facilities. All facilities shall be designed and constructed in accordance with these Standards as well as applicable State and Federal regulations.

The purpose of these Standards is to establish a minimum criteria for design and workmanship. The jurisdiction of the Standards is as follows:

A. Sanitary Sewers

The entire sanitary system and appurtenances from the point of connection with the building plumbing to the final point of discharge at the treatment facility.

It shall be the Owner's/Contractor's responsibility to comply with all requirements of the Town or other authority having jurisdiction on work if such authority imposes greater requirements. Furthermore, the Owner shall be responsible for procuring all necessary permits and licenses, pay all charges and fees for acquiring and recording all easements, and giving all notices necessary and incidental to the work.

Addenda and/or revisions to these Standards may be issued periodically and will be distributed and made available to the public and contractor at the Town Hall. Users shall be responsible to keep apprised of any changes and revisions to these Standards.

Any conflicts between these Standards and any applicable State laws shall be superseded by such law. If any conflict arises between these Standards and applicable Town or County Ordinances, these Standards shall prevail. These Standards are approved and adopted by the Town Council, Town of Newburgh.

SECTION 2

TOWN CHECKLISTS

SECTION 2 TOWN CHECKLISTS

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TOWN OF NEWBURGH

SANITARY SEWER LINES PROCEDURES FOR CONSTRUCTION (CHECK LIST)

Date
Received/
Requested

Date
Appr./
Sent

PROJECT NO.: _____

PROJECT NAME: _____

- | | | |
|-------|-------|---|
| _____ | _____ | 1. Developer submits preliminary plans of proposed development with estimated capacity demand to Sewer Department office for preliminary review and response, and application for a sewer contract. These plans shall contain the following information:

A. Schematic of the proposed system.
B. Total number of lots.
C. Projected flow rate.
D. Point of connection to the existing system.

Plans will be forwarded to the Sewer Superintendent for approval. Once approved, the Superintendent will notify the Sewer Department office that a capacity letter can be sent to the Plan Commission. |
| _____ | _____ | 2. Developer submits three (3) sets construction plans, construction permit application, and contract application to Sewer Department office. Please include the legal description of property and the Cross-reference number. |
| _____ | _____ | 3. Sewer Department will forward construction plans and permit application to the Town's Engineer for review, and application for a contract to the Town's Attorney. |
| _____ | _____ | 4. Sewer Department will notify IDEM that a construction permit application has been received. |
| _____ | _____ | 5. Town's Engineer will review the plans and permit application for completeness, conformance with the Town standards, and evaluate whether the existing collection system can accommodate the sewage generated by this project. The Town's Engineer will request the developer's engineer to make any needed changes in the plans. The fees imposed will be at the actual cost incurred by the Town. |
| _____ | _____ | 6. The Town's Engineer will recommend approval or provide a list of recommended changes to the plans for construction to the Newburgh Town Council. |

Date
Received/
Requested

Date
Appr./
Sent

- | | | |
|-------|-------|---|
| _____ | _____ | 7. Sewer contract is executed by Town and Developer and recorded by the Town. Town approves issuance of construction permit. |
| _____ | _____ | 8. Developer transmits bond and insurance certificate with the Town of Newburgh as the additionally insured. |
| _____ | _____ | 9. The developer receives Construction Permit from the Town. |
| _____ | _____ | 10. Sewer Department will notify IDEM that a construction permit was issued. |
| _____ | _____ | 11. Sewer Department notifies Town engineer that project is ready for construction inspection. |
| _____ | _____ | 12. The developer's contractor begins construction by notifying the Town at least 24 hours in advance of beginning work and on a daily basis during construction. |
| _____ | _____ | 13. The sewer system is air tested and mandrel tested. Manholes are vacuum tested. When punch list has been prepared and the system found functional for its intended purpose, the Engineer will prepare and forward a Certificate of Substantial Completion for the Owner's signature. This document shall be returned in triplicate to the Sewer Office at 23 West Jennings Street, 47629 or mailed to P.O. Box 100, 47629. |
| _____ | _____ | 14. The developer's engineer submits two (2) sets of proposed record drawings (prints) and any easements required to the Town's Engineer for review. |
| _____ | _____ | 15. The Town or its Agent prepares a punch list for the project. |
| _____ | _____ | 16. The developer's contractor/engineer shall complete the punch list within 90 days from the date of Substantial Completion. Failure to complete the punch list will result in total restriction of sewer tap sales for the development. |
| _____ | _____ | 17. The Town or its Agent re-inspects the project. |
| _____ | _____ | 18. The developer's engineer submits two (2) sets of prints and one of the approved record drawings for the Town's files. As-built drawings shall also be submitted on CD/DVD computer disk or compact disk in either vector format (DWG, DXF files) or Portable Document File format (PDF files). |

- _____ 19. The Town's Engineer recommends approval for acceptance for maintenance to the Newburgh Town Council.
- _____ 20. All easements are accepted and recorded by the Newburgh Town Council.
- _____ 21. The Town Council approves the sewer system for acceptance for maintenance with a 10% Letter of Credit and issues a Letter of Acceptance to the Developer. The Developer/Owner can reduce the surety for the project to 10% of the total estimate construction cost for a period of not less than one year from the date of Substantial Completion. This surety will cover maintenance that may be necessary during the one year maintenance period.

**TOWN OF NEWBURGH
PLAN & SPECIFICATION REVIEW CHECKLIST**

NAME OF PROJECT: _____

DESIGN ENGINEER: _____

I. Completeness and Conformance With Town Standards

A. Manholes & Cleanouts

1. Manhole Numbers, Rim & Invert Elevations
2. Manhole/Cleanout Materials & Construction
3. Spaced Max. Of 400' Apart
4. Standard Manhole: 5' Deep or Greater.....
5. Shallow, flat top, Manholes: Less than 6'
6. Drop Manhole: 2' Drop of Greater
7. Manholes at Finish Grade
8. Details Complete.....
9. Specs Complete

B. Gravity Sewer Pipe

1. Pipe Numbers, Lengths, Sizes (8" Min.), and Slopes
2. All Sewer Lines Planned and Profiles.....
3. Depth: 3' Min. to Top of Pipe
4. Pipe Materials
5. Pipe Bedding & Backfill Materials & Construction.....
6. Depth Restrictions.....
7. Details Complete.....
8. Specs Complete

C. Laterals & Wyes

1. Wyes Connected to Sewer, Not Manholes
2. Basement Connection Requirements (See Specs)
3. Pipe Size: 4" Min for Single Family, 6" Min for All Other Installations
4. Lateral Provided for All Lots
5. Pipe Material
6. Lateral Locations, Length Indicated on Plans.....
7. Pipe Slope: Min. 1%.....
8. Details Complete.....
9. Specs Complete

D. Force Main

1. Pipe and Fitting Material
2. Valve Types & Materials
3. Pipe Size: 6-Inch Min. (10-States).....
4. Depth: 3' Min. to Top of Pipe
5. Pipe Bedding & Backfill Materials & Construction.....
6. Specs Complete
7. Details Complete.....
8. Air/Vacuum Release Stations

- E. Pump Stations
 - 1. Wet Well Size: Min. 15 Minute Detention Time
 - 2. Pump Capacity: Min. 300 GPM.....
 - 3. Pump Able to Pass 3-inch Sphere
 - 4. Double Mechanical Seals.....
 - 5. Piping Inside Station: D.I. Class 50
 - 6. NEMA 4X Enclosure for Controls
 - 7. Access Road & Fencing.....
 - 8. Specs Complete
 - 9. Details Complete.....

- F. Connections To Existing Sewers
 - 1. Details of Connections
 - 2. Existing Sewer Sizes & Materials Indicated.....
 - 3. Compare Existing Sewers to Town Sewer Map
 - 4. Connection to Existing Sewer Made Using New Manhole Over Line.....

- G. Other Utility Conflicts
 - 1. Horizontal Separation of 10' Min. To Water Lines
 - 2. Vertical Separation of 18" to Water Lines.....
 - 3. Horizontal & Vertical Separation Between Other Utilities.....

- H. Miscellaneous
 - 1. Easement Widths: 12' up to 10' Deep, 2' More for Every 1' Deeper.....
 - 2. Engineer's Seal & Signature
 - 3. Page Numbers, Set Complete.....
 - 4. Specs Complete
 - 5. North Arrow on Each Sheet
 - 6. Benchmark Indicated on Plans.....
 - 7. Scale Indicated on Plans.....
 - 8. Roads Labeled.....
 - 9. Contours Labeled.....
 - 10. Existing & Final Grade Shown on Profiles.....
 - 11. Check Additional Notes, Details, Spec. Sections

II. Calculations

- A. Design Flow
 - 1. 100 Gallons Per Capita Per Day or 310 Per House Per Day.....
 - 2. Use 10-States Peaking Factors.....

III. Cost Estimate

PLAN REVIEW DATE:
 LETTER SENT:
 PLANS RESUBMITTED:
 APPROVAL DATE:

CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER's Project No.: _____
ENGINEER's Project No.: _____

Project: _____

CONTRACTOR: _____

Contract for: Town of Newburgh.....
Contract Date: _____

This Certificate of Substantial Completion applies to all Work under the Contract Documents, or to the following specified parts thereof:

To: _____ **Town of Newburgh, Indiana**
OWNER

And To: _____
CONTRACTOR

The work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR, and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR with ____ days of the above date of Substantial Completion.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as follows:

RESPONSIBILITIES:

OWNER: _____

CONTRACTOR: _____

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

Executed by ENGINEER ON _____, 20__

ENGINEER

BY: _____

CONTRACTOR accepts this Certificate of Substantial Completion on _____, 20__

CONTRACTOR

BY: _____

OWNER accepts this Certificate of Substantial Completion on _____, 20__

OWNER

BY: _____

**Town of Newburgh, Indiana
Submersible Lift Station
Final Inspection Checklist**

Date: _____	Location: _____
Lift Station ID: _____	KW Meter Number: _____
Pump Manufacturer: _____	Pump Supplier: _____
Pump Model: _____	Serial number: _____
Voltage: _____	Phase: _____
Hertz: _____	Horsepower: _____
Control Panel model: _____	Control Panel Supplier: _____
Contractor: _____	Engineer: _____

I. ELECTRIC

- A. Is the power system 3 phase or 1 phase? _____
- B. If 3 phase, is grounded neutral power provided? ☐ Yes ☐ No
- C. If above answer is "No" is transformer installed? ☐ Yes ☐ No
- D. Voltage readings
1. Between phases: L1, L2 _____ L1, L3 _____ L2, L3 _____
2. High phase to ground _____
3. Other legs to ground _____
- E. High Leg (L3) is connected to motor only and not connected to any auxiliary circuits. ☐ Yes ☐ No
- F. Do latches on control panel work smoothly? ☐ Yes ☐ No

II. PUMP AND MOTOR CONTROLS

- A. Breaker switches operate properly:
- | | | |
|---------------------------|------------------------------|-----------------------------|
| 1. Pump # | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. Pump #2 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. Pump #3 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Control Circuit | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. Remote Control Monitor | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

- B. Hand-Off-Automatic switches:
- | | | | | |
|---|--------------------------|-----|--------------------------|----|
| 1. Pump #1 hand position operates | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Pump #2 hand position operates | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. Pump #3 hand position operates | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 5. Pump #2 Auto position operates | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 6. Pump #3 Auto position operates | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 7. Do the floats sequence all pumps
with relation to lead, lag, and alternation? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
- C. Amperage:
- | | | | | |
|---|--------------------------|-----|--------------------------|----|
| 1. Name Plate Rating (amps) Pump #1 Motor | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Amps pulled by Pump #1 Motor | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. Name Plate Rating (amps) Pump #2 Motor | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 4. Amps pulled by Pump #2 Motor | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 5. Name Plate Rating (amps) Pump #3 Motor | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 6. Amps pulled by Pump #3 Motor | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
- D. Seal Failure/Heat Sensor:
- | | | | | |
|--|--------------------------|-----|--------------------------|----|
| 1. Seal failure wires connected properly
to seal failure circuit? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Test seal failure circuit OK? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. Heat sensor wires connected properly
to heat sensor circuit? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 4. Test heat sensor circuit OK? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
- E. Control Components:
- | | | | | |
|---|--------------------------|-----|--------------------------|----|
| 1. Verify all electrical components are locally available | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
|---|--------------------------|-----|--------------------------|----|
- F. Alarms:
- | | | | | |
|--|--------------------------|-----|--------------------------|----|
| 1. High water alarm light and horn activate with
the test button. | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Horn silences with silence button. | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. High water alarm light and horn activate with float. | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
- G. Float Settings:
- | | |
|---|----------------------|
| 1. Lead pump kicks on at Elv. _____ (' _____ ") | from wet well bottom |
| 2. Lead pump kicks off at Elv. _____ (' _____ ") | from wet well bottom |
| 3. Lag pump kicks on at Elv. _____ (' _____ ") | from wet well bottom |
| 4. Lag pump kicks off at Elv. _____ (' _____ ") | from wet well bottom |
| 5. Back up pump kicks on at Elv. _____ (' _____ ") | from wet well bottom |
| 6. Back up pump kicks off at Elv. _____ (' _____ ") | from wet well bottom |
| 7. Height of influent sewer above floor of wet well _____ ' _____ " | |
| 8. Height of high water alarm above floor of wet well _____ ' _____ " | |
| 9. Top of basin Elv. _____ | |
| 10. Total basin depth _____ ' _____ " | |

Remarks:

III. PUMPS AND MOTORS

A. Operation:

- | | | | | |
|----------------------------------|--------------------------|-----|--------------------------|----|
| 1. Are pumps running quietly? | | | | |
| a. Pump #1 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| b. Pump #2 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| c. Pump #3 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Are motors running quietly? | | | | |
| a. Pump #1 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| b. Pump #2 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| c. Pump #3 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. Is excessive vibration noted? | | | | |
| a. Pump #1 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| b. Pump #2 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| c. Pump #3 | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

B. Installation:

1. Are guide rails exactly vertical (plumb)?
2. Is base elbow installed level?

Remarks:

IV. REMOTE MONITOR PANEL

- A. Verify start-up procedure completed properly and put "On-Line" with the Wastewater Plant by remote monitor panel supplier. ☐ Yes ☐ No

V. VALVES

A. Check valves:

- | | | | | |
|---|--------------------------|-----|--------------------------|----|
| 1. Do clappers swing freely? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Does packing leak? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. Are counter weights adjusted properly? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

B. Plug valves:

- | | | | | |
|---|--------------------------|-----|--------------------------|----|
| 1. Do valves open and close freely? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Does packing leak? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. During operation, are all gates completely open? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

Remarks:

VI. PUMP STATION TESTING

A. Draw Down Test

Diameter of wet well _____ ' _____ "
 (5'-0" = 150 gal/ft 6'-0" = 212 gal/ft 7'-0" = 288 gal/ft 8'-0" = 376 gal/ft)

	Time	Depth	Vol. per Unit Depth	Total Vol.	Pump Capacity
Pump #1 On	_____	_____	_____	_____	_____
Pump #1 Off	_____	_____	_____	_____	_____
Pump #2 On	_____	_____	_____	_____	_____
Pump #2 Off	_____	_____	_____	_____	_____
Pump #3 On	_____	_____	_____	_____	_____
Pump #3 Off	_____	_____	_____	_____	_____
Pump #4 On	_____	_____	_____	_____	_____
Pump #4 Off	_____	_____	_____	_____	_____
Pump #1,2 On	_____	_____	_____	_____	_____
Pump #1,2 Off	_____	_____	_____	_____	_____
Pump #1,3 On	_____	_____	_____	_____	_____
Pump #1,3 Off	_____	_____	_____	_____	_____
Pump #2,3 On	_____	_____	_____	_____	_____
Pump #2,3 Off	_____	_____	_____	_____	_____
Pump #1,4 On	_____	_____	_____	_____	_____
Pump #1,4 Off	_____	_____	_____	_____	_____
Pump #2,4 On	_____	_____	_____	_____	_____
Pump #2,4 Off	_____	_____	_____	_____	_____
Pump #3,4 On	_____	_____	_____	_____	_____
Pump #3,4 Off	_____	_____	_____	_____	_____

B. Pressure Test

1. No Pumps Running - Static Back Pressure: _____
2. Pump No. 1 Operating - Pressure: _____
3. Pump No. 2 Operating - Pressure: _____
4. Pump No. 3 Operating - Pressure: _____
5. Pump Nos. 1 & 2 Running - Pressure: _____
6. Pump Nos. 2 & 3 Running - Pressure: _____
7. Pump Nos. 1 & 3 Running - Pressure: _____

Remarks:

VII. EQUIPMENT

- A. Pumps
- B. Motors
- C. Pump Circuit Breaker
- D. Starters
- E. Heaters
- F. Control Circuit Breaker
- G. Remote Monitor Circuit Breaker
- H. Alternator
- I. H-O-A Switches
- J. Plug Valves
- K. Check Valves
- L. Pressure Gauge
- M. Transducer
- N. Floats
- O. Other

Remarks:

VIII. COVERT ALARM SYSTEM

- A. Do latches on control panel work smoothly? ☐ Yes ☐ No
- B. Code indication functioning
- | | | |
|---|------------------------------|-----------------------------|
| 1. Pump overload trip | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. Crew on site key switch | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. Wet well high water | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Dry pit high water or submersible seal failure | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. Power failure | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 6. Open | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 7. Restore to normal | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 8. Low battery | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Remarks:

I CERTIFY THIS REPORT IS ACCURATE

Start-up date/time

Start-up Coordinator

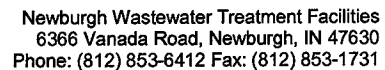
Factory Representative

Wastewater Utility Superintendent

Wastewater Utility Operator

Engineer

Contractor

2-14



Town of Newburgh Grease Trap Inspection Report

Newburgh Wastewater Treatment Facility
6366 Vanada Road, Newburgh, IN 47630
Phone: (812) 853-6412 Fax: (812) 853-1731

Owner: _____ Contractor: _____
Subdivision: _____ Section: _____ Date: _____
Lot Number: _____ Time: _____
Address: _____ Account Number: _____

1.	Is the trap sized according to Indiana State Board of Health, Bulletin S.E. 13 as described in section 12B.02E and figure A2.4 of the Newburgh Sanitary Sewer Design and Construction Standards? The number of meals per hour used to size the trap shall not be less than the total seating capacity of the restaurant.	Trap Size: _____ gallons	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2.	Does the trap serve only the business that is required to have the trap?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
3.	Is the trap installed as close as possible to the source of grease?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
4.	Is the trap located where it is easy to access for inspection and maintenance?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
5.	Is the trap located at a minimum set back slope of 1:1 from the base of the building foundation to the bottom of the excavation where it is to be installed?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
6.	Is the trap installed with bedding and backfill as specified in section 12B.02E2? (excavated area to be over cut by one (1) foot on all sides, min. twelve (12) inches of compacted No. 8 stone for base, backfill with No. 8 stone to within twelve (12) inches of final grade.)		Yes <input type="checkbox"/>	No <input type="checkbox"/>
7.	Does the access manhole have a watertight manhole frame and cover and a minimum diameter of twenty-four (24) inches?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
8.	Is there a minimum of two (2) baffles provided for grease retention, one on the inlet side and one on the outlet side as shown on figure A2.4 of the standards?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
9.	Does the trap have an adequate number of access manholes provided for cleaning and maintenance of all compartments? Figure A2.4 shows one access manhole and two inspection plugs.		Yes <input type="checkbox"/>	No <input type="checkbox"/>
10.	Are all sewer connections to the trap cored and sealed with approved materials?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
11.	Is the trap vault waterproofed with coal tar epoxy or Sewer Department equal?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
12.	Is a six (6) inch diameter cleanout installed within three (3) feet of the outlet side of the trap?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
13.	Is trap in a traffic area or loading area? If so, verify with Town Engineer that it has adequate reinforcement to insure that it can sustain HS 20 loading requirements. (Minimum 16,000 LBS dynamic wheel load).		Yes <input type="checkbox"/>	No <input type="checkbox"/>
14.	List make and model numbers of manufactured unit:		Yes <input type="checkbox"/>	No <input type="checkbox"/>
15.	List trap interior dimensions (height to designed water level, width and length) and calculate volume to insure proper volume is provided: _____ Ft Long X _____ Ft Wide X _____ Ft Height X 7.48 = _____ Gallons Is the trap volume greater than or equal to the volume determined in Number 1, above?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
Inspector's Comments:				
Inspected by: _____ Partial Approval (explain above): <input type="checkbox"/> Final Approval: <input type="checkbox"/> Rejected: <input type="checkbox"/>				
Contractor Signature: _____				
Drawing: Include grease trap location, main size, main location, building location, lateral location, cleanout locations, downstream MH, and MH #, with distances to all structures and building. Also, indicate the direction "North".				

**Town of Newburgh
Grinder Pump Lift Station
Inspection Report**

Newburgh Wastewater Treatment Facilities
6366 Vanada Road, Newburgh, IN 47630
Phone: (812) 853-6412 Fax: (812) 853-1731

Owner: _____ Contractor: _____
Subdivision: _____ Section: _____ Date: _____
Lot Number: _____ Time: _____
Address: _____ Account Number: _____

1. Have the operating conditions and specifications for the private lift station been submitted, reviewed and approved by the Superintendent or Engineer?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2. Is the lift station being installed for a single family residence? If so, verify that a simplex pump system is being installed.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
3. Is the lift station being installed for a multi-family residence, commercial business or industrial user? If so, verify that a duplex pump system is being installed.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4. Does the lift station have a control panel installed with a high water flashing alarm light mounted on top of the enclosure such that it is visible from all directions?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5. Does the wet well have an access hole 24 inches in diameter or greater?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6. Does the lid for the access hole have a waterproof seal?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7. Is the wet well installed at a minimum setback slope of 1:1 from the base of the building foundation to the bottom of the excavation where it is to be installed?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
8. Is the wet well installed with bedding and backfill as specified in Section 12E.03C? (excavated area to be over-cut a min. of one (1) foot on all sides, min. twelve (12) inches of compacted No. 8 stone for base, backfill with No. 8 stone to within twelve (12) inches of final grade).	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9. Has concrete ballast been installed for the wet well? Was the quantity of concrete required for this well calculated and approved by the Superintendent or Town Engineer? (for standard 24-inch diameter basin, amount of concrete required is 2 cubic feet per foot of basin depth. If basin larger contact Town Engineer).	Yes <input type="checkbox"/>	No <input type="checkbox"/>
10. Are all sewer connections to the wet well cored and sealed with approved materials? List the size and type of all connecting lines.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
11. Has the building lateral and force main been installed per the specifications set forth in section 12 of the standards?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
12. If the wet well is concrete, is it waterproofed with coal tar epoxy or approved equal?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
13. List all pertinent make and model numbers for the pump(s) or manufactured unit:		
Inspector's Comments:		
<p>Inspected by: _____ Partial Approval (explain above): <input type="checkbox"/> Final Approval: <input type="checkbox"/> Rejected: <input type="checkbox"/></p> <p>Drawing: Include private lift station location, location and size of all lines involved including the main, building location, cleanout locations, downstream MH, and MH #, with distances to all structures and building. Also, indicate the direction "North".</p>		

Approved: 04-05-06
Original to Office Manager, Yellow Copy to C.S. Supervisor, Pink Copy to Contractor

SECTION 3

DEFINITIONS AND TERMS

SECTION 3
DEFINITIONS AND TERMS

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SECTION 3

DEFINITIONS AND TERMS

3.01 Definitions and Terms

Whenever in these Standards or in any documents the following terms, abbreviations, or definitions are used, the intent and meaning shall be interpreted as follows:

A. Abbreviations

IDOTSS	Indiana Department of Transportation Standard Specifications
MUTCD	Manual on Uniform Traffic Control Devices, latest edition
ADASS	American National Standards for Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People, latest edition
ASTM	American Society of Testing and Materials
AASHTO	American Association of State Highway and Transportation Officials
AWWA	American Water Works Association
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ACI	American Concrete Institute
NEMA	National Electrical Manufacturers Association
INDOT	Indiana Department of Transportation
OSHA	Federal Occupational Safety and Health Act
NSF	National Sanitation Foundation
IDEM	Indiana Department of Environmental Management
ISO	Insurance Services Office, State of Indiana

B. Definitions

1. **Acceptance:** The formal written acceptance by the Town of Newburgh (Town) of an entire project which has been completed in all respects in accordance with the approved Plans, Specifications and these Standards including any previously approved modifications thereof.
2. **Backfill:** Earth and/or other material used to replace material removed from trenches during construction which is above the pipe bedding.
3. **Bedding:** That portion of the trench backfill which encases the sewer or water pipe to a minimum depth above and below the bell/barrel of the pipe, as provided in the **Bedding** section of these Standards, for the purpose of properly supporting the pipe.
4. **Building Sewer (service lateral):** The conduit for transporting waste discharged from the building to the public sewer commencing three (3) feet outside the building walls and ending at the wye or tee fitting at the connection to the public sewer.

5. **Contractor:** Any Contractor who meets the Town's requirements and is licensed to enter into contracts for and to perform the work of installing sewers.
6. **County:** The County of Warrick, State of Indiana.
7. **Easement:** Easements are areas along the line of all public sanitary and storm sewers and water lines which are outside of dedicated utility or road easements or rights-of-way, and are recorded and dedicated to the Town granting rights along the line of the sewer. Easements shall be exclusively for sanitary sewers. No other utilities shall be constructed or encroach upon the easement except with the expressed written approval of the Town.
8. **Engineer:** The Engineer for the Owner.
9. **Infiltration/Inflow:** The total quantity of water from both infiltration and inflow without distinguishing the source.
10. **Inspector:** An agent of the Town assigned to make detailed inspection of any or all portions of the work and materials. The inspector has full authority to reject materials and/or any portion of the work not supplied and installed in accordance with these Standards.
11. **Lift Station:** Any arrangement of pumps, valves and controls that lift and/or convey wastewater to a higher elevation.
12. **Other Specifications and Materials:** Wherever in these Standards other specifications or regulations are mentioned, it shall be understood that the materials and methods mentioned therewith shall conform to all requirements of the latest revision of the specifications so mentioned.
13. **Owner:** Any individual, partnership, firm, corporation or other entity who, as property owner, is initiating the work.
15. **Plans:** Construction plans, including system maps, sewer plans and profiles, cross sections, utility plans, detailed drawings, etc., or reproductions thereof, approved or to be approved by the Town Engineer which show location, character, dimensions and details of the work to be done.
16. **Project:** All work to be completed under the Town's permit in accordance with the approved plans, specifications, these standards and the permit conditions.
17. **Record Drawing (As-Builts):** Plans certified, signed and dated by a professional engineer registered in the State of Indiana, indicating that the Plans have been reviewed and revised, if necessary, to accurately show all as-built construction and installation details including, but not limited to, key elevations, locations and distances.

18. **Right-of-Way:** All land or interest therein which by deed, conveyance, agreement, easement, dedication or process of law is reserved for or dedicated to the use of the general public, within which the Town shall have the right to install and maintain sewers, water lines, and streets.
19. **Sewer:** A pipe or conduit for carrying wastewater (sanitary sewer) and storm water (storm sewer).
20. **Standard Drawings:** The drawings of structures, sanitary sewer lines, or devices commonly used and referred to on the Plans and in these Standards.
21. **Standards:** The Standards for Public Works Projects Design and Construction within the Town of Newburgh sewer system as contained herein and all subsequent additions, deletions or revisions.
22. **Street:** A street is an area within a right-of-way which affords the principal means of access to abutting property.
23. **Substantial Completion:** The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the project plans and specifications, so that the Work (or specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
24. **Ten State Standards (sewage works):** Recommended Standards for Sewage Works, latest edition, developed by the Committee of the Great Lakes - Upper Mississippi River Board of State Sanitary Engineers.
25. **Town:** Town of Newburgh, Indiana.
26. **Town Engineer:** Authorized Agent by the Town of Newburgh.
27. **Trunk Line:** A large sewer that collects wastewater from submains and conveys it to a treatment plant or pumping station (also called interceptor). In general, lines shall be considered trunk lines when the design capacity of the sewer is rated at 1200 gpm and the sewer is 15 inches and larger.
28. **Uniform Plumbing Code:** The Uniform Plumbing Code adopted by the International Association of Plumbing and Mechanical Officials, current edition.
29. **Watercourse:** The meaning of watercourse shall include channel, creek, ditch, river or stream.
30. **Work:** All the work to be done, in accordance with the approved Plans, Specifications, these Standards and permit conditions.

SECTION 4

**GENERAL RULES
AND REQUIREMENTS**

SECTION 4 GENERAL RULES AND REQUIREMENTS

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SECTION 4

GENERAL RULES AND REQUIREMENTS

4.01 General

This Section provides the general rules and policies, the construction of facilities as part of sanitary sewers, including permit requirements and inspection. The ordinances for sanitary sewer systems governing these Standards are available for inspection at the Town Hall.

The following paragraphs provide a highlight of the provisions contained in the applicable Town Ordinances.

A. Prohibition Against Clean Water Discharges

No person shall discharge or cause to be discharged to any sanitary sewers either directly or indirectly:

- Storm Water
- Surface Water
- Ground Water
- Roof Runoff
- Subsurface Drainage (gravity or pumped)
- Uncontaminated Cooling Water
- Unpolluted Water
- Unpolluted Industrial Process Water

4.02 Design/Construction Approval for Development

A. Requirements for Construction Permits

It shall be the responsibility of the Owner/Contractor to obtain a valid Construction Permit for the construction or modification of any facility as part of sewers from the Indiana Department of Environmental Management (IDEM), Indiana Department of Transportation, or any other applicable regulatory agency.

A copy of this permit shall be filed with the Town.

B. Water Main Protection

1. Horizontal and Vertical Separation: Sewers shall be laid at least 10 feet (3 m) horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot (3 m) separation, the appropriate reviewing agency may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the sewer closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of

the sewer and at an elevation so the bottom of the water main is at least 18 inches (460 mm) above the top of the sewer.

If it is impossible to obtain proper horizontal and vertical separation as described above, both the water main and sewer must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards of the agency and be pressure tested to 150 psi (1034 kPa) to assure watertightness before backfilling.

2. Crossings: Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches (460 mm) between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to maintain line and grade.

When it is impossible to obtain proper horizontal and vertical separation as stipulated above, one of the following methods must be specified:

- a. The sewer shall be designed and constructed equal to water pipe, and shall be pressure tested at 150 psi (1034 kPa) to assure water tightness prior to backfilling.
- b. Either the water main or the sewer line may be encased in a watertight carrier pipe which extends 10 feet (3 m) on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of materials approved by the regulatory agency for use in water main construction.

C. Technical Review Committee

The Owner/Contractor shall submit design drawings for review and approval to the Town Engineer. For each project the Owner/Contractor shall request a presentation hearing before the Utilities Committee through the Wastewater Superintendent. During this meeting the Committee may recommend approval of the project or request formal revisions. Revised drawings and specifications shall be resubmitted to the Town Engineer for final approval.

D. Final Plan Approval

The Town Engineer shall issue final approval for all projects after clearing the Utilities Committee.

E. Posting of Bond

1. The Town requires the posting of a performance bond from a company licensed by the State of Indiana to provide such surety. Such bond shall be equal to 100% of the contract amount or an amount established by the

Town to provide surety for the satisfactory completion of the improvements and shall name the Town of Newburgh who can enforce the obligations thereunder. The duration of the bond shall be one (1) year.

2. The Town requires the posting of a maintenance bond from a company licensed by the State of Indiana to provide such surety. Such bond shall be equal to 10% of the contract amount or an amount established by the Town to provide surety for the satisfactory completion of the improvements and shall name the Town of Newburgh who can enforce the obligations thereunder. The duration of the bond shall be one (1) year.
3. The Town may, as an alternative to the posting of such bond, accept other appropriate security such as properly conditioned irrevocable letter of credit which meets the same objective as the bonds described in this section, subject to approval of any other department or agency whose interests are protected by the same bonding requirement. The bank issuing the letter of credit must be a bank situated in Indiana and must be an FDIC insured institution.
4. If the surety on any bond furnished to the Town becomes a party to a supervision, liquidation, rehabilitation action pursuant to I.C. 27-9 et. seq. or its right to do business in the State of Indiana is terminated, it shall be required that, within thirty days thereafter, a substitute bond and surety be provided, both of which must be acceptable to the Town. Failure to obtain a substitute bond within the stated time frame shall be cause for revocation or suspension of the project approval until such time that the bond is furnished to the Town.

F. Pre-Construction Inspection

The Owner/Contractor shall conduct a pre-construction, video taped, inspection of the construction site to serve as a permanent record of pre-construction conditions.

The product shall be high quality audio and video tape. The video portion shall present bright, sharp, clear pictures with accurate colors. The picture shall be free from distortion, tearing, rolls or other picture imperfection. The audio portion shall be proper volume, clarity and free of distortion. The audio commentary shall be precise and concise explanatory notes.

The recordings shall include coverage of all surface features located along the main route. The tape coverage shall include all existing cross streets, driveways, sidewalks, curbs, ditches, shrubbery or other structures located along the route.

G. Construction Inspection

Prior to issuance of the final project approval and commencement of any construction activities pertaining to the installation of any public works project,

the Owner/Contractor shall execute an Agreement with the Town, which will provide that:

1. The Town may utilize its own personnel or contract for construction inspection service to insure that materials and workmanship meets the requirements of the approved plans and specifications.
2. The Owner/Contractor will be responsible for submitting and certifying air pressure or infiltration test results for all sewer pipe and deflection test results for all flexible and semi-rigid pipe, force main pressure tests, and all other testing as required.
3. The Owner/Contractor will reimburse the Town for the cost of such services which shall be determined at the time of execution of the Agreement, and verified by the Owner or his representative throughout construction.
4. No action with regard to the acceptance of the construction and release of the improvement bond pursuant to this section shall be taken until the Owner/Contractor has reimbursed the Town in full for the inspection services.
5. All construction of public works facilities intended for dedication to the Town shall be observed and certified pursuant to the Agreement.
6. The Owner/Contractor shall furnish the Town with three (3) copies of the approved construction plans and specifications at the time the Agreement is executed.

H. Requirements for Project Acceptance and Dedication

Public Works facilities will not be accepted until all documents, as required by the Town, are submitted to and approved by the Town Engineer and the Town Council, including the following:

1. One (1) Year Maintenance Bond;
2. Recorded Covenant and Easement Documents;
3. The completion of a final inspection which confirms that the project has been constructed and tested in accordance with the Town's Standards; and
4. As-Built/as-constructed drawings.

4.03 Safety

Neither the Town nor its Engineer are responsible for safety on the job site. All codes, statutes and regulations relating to safety on the job site shall be followed by the Owner, Developer and Contractor. Direction by the Engineer, and inspections by the Engineer,

are not designed to assure safety on the job, only that the sewer is built according to these standards and the drawings. The Contractor constructing the sewer shall advise each of its employees that the Town and the Engineer are not responsible for safety on the site.

A. Confined Space Access

For projects which include construction activities within "confined spaces" as defined by Title 29 CFR Part 1926.21(b)(6), the Contractor is hereby advised that he must fully comply with all pertinent requirements as delineated in this regulation and as interpreted by OSHA. The Contractor shall have and maintain all necessary safety and testing equipment at all times during the course of the construction activity.

B. Hazard Communication Standard

Pursuant to the Code of Federal Regulations, 29 CFR Part 1926, as may be amended, all Contractors, Subcontractors and materials suppliers on this Project shall provide access to all persons on the job site at all times, the Material Safety Data Sheets (MSDS) for all hazards of all chemicals per the Federal Regulations.

In addition, Contractors, Subcontractors and material suppliers shall provide training to their employees on the MSDS pursuant to the Federal Regulations.

C. Excavation Safety Requirements

It shall be the duty and responsibility of the Contractor and all of its Subcontractors to be familiar and comply with all requirements of Public Law 91-596 29 U.S.C., Sections 651 et. seq., the Occupational Safety and Health Act of 1970 (OSHA) and all amendments thereto and to enforce and comply with all of the provisions of the Act. In addition and as required by Indiana State Law, HB 2071, Section 14. of IC 4-13.6-5-12, the Contractor and all of its Subcontractors shall comply with Subpart P of 29 CFR 1926 dated October 31, 1989 as may be amended.

SECTION 5

GENERAL DESIGN STANDARDS

SECTION 5 GENERAL DESIGN STANDARDS

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SECTION 5

GENERAL DESIGN STANDARDS

5.01 General

The Town Council shall issue final approval for the installation of all public works facilities. All facilities shall be designed and installed in accordance with these Standards as well as applicable State and Federal regulations.

5.02 Sanitary Sewer Design Criteria

A. General

All sanitary sewers shall be designed and constructed in accordance with IDEM and Ten States Standards for Sewage Works Improvements.

All sanitary sewers shall be designed to carry the estimated flow from the area ultimately contributing to the respective service area of the sanitary sewer. The required capacity shall be established by Town Engineer or at the Town's option by means of a study conducted by the Owner/Contractor or his authorized representative engineer.

1. Residential

For the purpose of design, the average family unit is considered to generate 310 gallons per day per single family home. Peak flows shall be determined by Ten States Standards.

2. Commercial/Institutional

The average daily flow for these facilities shall be based on Bulletin S.E. 13 from the Indiana State Board of Health, latest edition. These documents shall be used as a general guideline. The Town Engineer may allow modification of these guidelines based upon information submitted by the Owner/Contractor or developed by the Town Engineer.

Peak flow shall be determined by multiplying the average flow by a factor determined by the Owner/Contractor and approved by the Town Engineer.

3. Industrial

For those industries which do not have any process wastewater discharge, flows shall be calculated as stated above in "Commercial/Institutional". For industries which will have a process discharge, the Owner shall submit detailed flow estimates for each process, duration and frequency.

Peak capacity shall be determined by multiplying the average discharge by a factor determined by the Owner/Contractor and approved by the Town Engineer.

4. Infiltration

Sanitary sewer design capacity must include an allowance to carry unavoidable amounts of groundwater infiltration or seepage in addition to the peak sanitary flows. Collector and trunk sewers shall be designed to include an allowance of two hundred (200) gallons per day per inch diameter mile of pipe.

B. Pipe Capacities

1. Collector Sewers

Collector sewers shall be classified as any sewer ranging between 8" and 12". Peak design flow capacities shall be based upon sewer flowing full without head.

2. Trunk Sewers

Trunk sewers shall be classified as any sewer 15 inches and larger.

Peak design flow capacities for trunk or interceptor sewers shall be based on sewers flowing full, without head, using the design population density and appropriate land use determined by the Town and Town Engineer, and shall include an allowance for infiltration which will be reviewed on a case-by-case basis and is subject to the approval of the Town Engineer.

No sewer laterals shall be connected to a sanitary sewer trunk line.

C. Minimum Pipe Sizes and Standards

1. Pipe Diameter

The required diameter of gravity sewers shall be determined by Manning's formula using a roughness coefficient, "n", of 0.013 or required by the latest Ten States Standards. The minimum pipe diameter for gravity sanitary sewers shall be eight (8) inches.

2. Minimum Slopes and Velocities

All sanitary collector and trunk sewers shall be designed and constructed to provide a minimum velocity when flowing full of two (2) feet per second. The slope of the pipe shall be such that these minimum velocity requirements are attained. The minimum acceptable slopes for the design and construction of sanitary sewers are as follows

Pipe Diameter (in)	Design Slope ('/100')	As-Built Min. ('/100')	Maintain 2 fps ('/100')
8	.450	.400	.333
10	.315	.280	.248
12	.248	.220	.194
14	.191	.170	.158
15	.169	.150	.144
16	.158	.140	.132
18	.135	.120	.113
21	.113	.100	.092
24	.090	.080	.077
27	.075	.067	.066
30	.065	.058	.058
33	.059	.052	.051
36	.052	.046	.045
39	.046	.041	.041
42	.042	.037	.037

a. Design

All plans submitted for review by the Town's Engineer shall conform to the "Design Slope" column above. Any plans not conforming to that standard shall not be approved for construction unless the "Design Slope" requirement has been specifically waived by the Town.

b. Casing Pipe

Sanitary sewers constructed with polyvinyl chloride (PVC) and installed under existing town, county and state roadways and railroads shall be cased in conformance with Appendix A. This provision may be applicable to installation of sewers in proposed subdivisions if the utility determines that the roadway classification or use warrants use of additional protection. Utilization of casing pipe for roadway crossings shall be at the sole discretion of the utility.

c. Post Construction

As-built plans are required to be submitted for acceptance of sewers by the Town. A) In the event the as-built slope equals or exceeds the "As-Built Min" column shown above, the Town will deem those sewers as having an acceptable slope. B) In the event that the as-built sewers are found to have a slope below the "As-Built Min" standard, but at or above the minimum slope required to "Maintain 2 fps" velocity when flowing full (using the Manning's equation with a roughness coefficient of .013), a 10-year sewer maintenance bond may be provided covering 100% of the replacement cost for the pipe section(s) necessary to meet the minimum standard on all sections of pipe or the non-compliant

pipe segments shall be re-installed at no cost to the Town. C) In the event that the as-built sewers are found to have a slope below the minimum slope required to "Maintain 2 fps" velocity when flowing full, the non-compliant pipe segments shall be re-installed at no cost to the Town.

3. Minimum Depth

In general, sewers shall be sufficiently deep so as to receive sewage from the first floor of all places served by the sewers. No below ground floors may be directly connected via a gravity sewer to the gravity sewer unless the floor is 1 foot above the rim of the upstream manhole. The sanitary sewers shall have a minimum earthen cover of 3 feet unless waived by the Engineer. The pipe shall have minimum cover as established by Ten State Standards under small stream or ditch crossings. The developer shall construct the sanitary sewer at reasonable depths to avoid interference with other utilities or drainage structures.

D. Sewer Structures

1. Manholes

a. General

Manholes shall be installed at the end of each line. Cleanouts will not be acceptable. Manholes shall also be installed at all changes in grade, size, materials or alignment, and at all sewer intersections. The interval between manholes shall not be greater than 400 feet, unless a greater distance is approved by the Town.

The minimum inside diameter of manholes shall be 48 inches.

Flow channels shall be shaped and formed in each manhole to provide a smooth transition of flow from all inlets to the outlet. The bench wall shall be formed to the crown of the inlet and outlet pipes to form a "U" as shown in the Standard Details.

At changes in sewer alignment and/or sizes, the energy gradient elevation shall not increase. This shall be accomplished by keeping the crown elevation continuous where possible for changes in sewer sizes.

Manholes proposed to be installed in unpaved areas shall be designed and constructed such that the top of the casting is flush with the finished grade to prevent ponding of water over the casting. Positive drainage away from the manhole shall be provided.

Manholes receiving discharge from force mains shall have an external drop connection. Internal drop connections may be approved by the department by obtaining a waiver. Manholes which have force main discharge lines to them shall have an internal epoxy coating to prevent corrosion.

When existing sewers are present within proposed developments, the sanitary sewer rim elevation shall be raised to the elevation of the proposed grade. Buried manholes in agricultural areas shall also be raised when present within new developments.

b. Outside Drop Connections

Outside drop pipe connections shall be provided for all sanitary sewers entering a manhole at an elevation greater than twenty-four (24) inches above the invert of the manhole.

In areas where future residential, commercial and/or industrial growth can occur, the Town Engineer shall determine which new manholes 15 feet deep or deeper shall be equipped with outside drop connections of a size and at an elevation to be determined by the Town Engineer at the time of design to allow for future connections at these points. The drops shall extend from the base to within 10 feet of the final graded surface elevation.

5.03 Lift Station and Force Main Design Criteria

A. General

All lift stations shall be designed and constructed in accordance with IDEM and Ten States Standards for Sewage Works Improvements. All design criteria and calculations shall be submitted to the Town Engineer for approval.

No lift station shall be approved for a project unless a 50-year life cycle analysis is submitted to the Town to demonstrate that it will be more cost-effective for the Town in lieu of constructing a gravity sanitary sewer.

B. Pump Sizing Criteria

Lift station pumps shall be provided to accommodate peak hourly flow with the largest pump out of service. A minimum of two (2) pumps shall be provided at each lift station.

C. Force Main

1. Force mains shall be designed to maintain a minimum velocity of 2 feet per second in order to avoid solids deposition in the pipe. Minimum force main size shall be 6" diameter unless specifically authorized by the Town Engineer.

2. Casing Pipe

Sanitary force mains constructed with polyvinyl chloride (PVC) and installed under existing and proposed town, county and state roadways and railways shall be cased in conformance with Appendix A.

3. Each high point along the force main profile where the grade of the main grade changes from positive to a negative grade, an air release valve shall be installed. Air valves shall be installed every 2500 feet on straight horizontal runs. If the design is such that negative pressure is developed internally within the main, provisions shall be incorporated into the design to prevent intense surges or possible pipe line collapse.

D. Lift Station Design

1. General

All lift stations shall be wet well/valve vault design utilizing submersible pumps in the wet well with a separate valve vault. Provisions for draining the valve vault into the wet well shall be made. Provisions shall be made also in the valve vault for connection to the **Town's portable pumping** equipment. No lift station having a capacity of less than 300 gpm shall be allowed unless specifically authorized by the Town.

2. Wet Well Sizing Criteria

The wet well storage below the lowest inlet shall be a minimum of:

5' - 0" for stations rated below 500 GPM

7' - 0" for stations rated above 500 GPM

and shall also meet the following criteria:

- a. OFF level to be set at the pump manufacturer's recommended level but no less than 1'0" from the bottom of the wet well.
- b. The distance between the OFF level and the lead pump ON level shall be set to provide storage capacity in gallons equal to:

$$\frac{15 \times \text{Rated Pump GPM}}{4}$$

(i.e. 15 minute cycle minimum)

- c. The lag pump ON Level shall be set a minimum of 6" above the lead pump ON level and a minimum of 6" below the lowest inlet invert.
 - d. The high water alarm float shall be set a minimum of 6" above the lag pump ON level and a minimum of 6" below the lowest inlet invert.
 - e. All levels shall be set below the lowest inlet invert.
3. Lift Station Capacity

All lift stations will be designed with a minimum capacity of 300 gpm; i.e., wet well size, piping, electrical, etc. In situations where low flows are

expected for an extended period of time after start-up, the Town may allow the installation of pumps with capacities less than 300 gpm. This will be reviewed on a case-by-case basis. In no case will pumps with capacities less than 180 GPM be allowed due to IDEM's requirement of maintaining 2 fps in force mains. All electrical appurtenances shall be sized for pumps that are capable of delivering 300 gpm each. Any additional electrical appurtenances, such as breakers, starters, etc. necessary to operate and protect the smaller pumps, shall also be included.

4. Lift Station Control Building

All new sanitary sewer lift stations shall include a control building. This building shall house the pump controls and provide a weather proof environment for working on these controls. The specifications for this building are identified in Section 7.

5.04 Easements

A. General

All sanitary sewer lines shall be protected by a Restricted Public Utility Easement (RPUE). The use of this easement is restricted to the Town of Newburgh Sanitary Sewer Utility and any other utilities supplying electricity, natural gas and potable water. Ingress and egress shall be available to the Town at all times to perform installation, maintenance, enlargement, and repair of facilities. This easement is not available for use by any telecommunication facilities, surface drainage, drainage ditching or storm sewers except for the purpose of crossing the easement approximately perpendicular thereto. Any fence, trees, overhanging branches, bushes, underbrush and obstructions located within the easement are subject to removal without liability by the Town.

All lift stations shall be protected by a dedicated Sanitary Sewer Easement. Ingress and egress shall be available to the Town at all times to perform installation, maintenance, enlargement, and repair of facilities. A minimum 40 foot by 40 foot easement shall be provided for all submersible lift stations with wet wells up to 40 feet deep.

The minimum easement shall be 12 feet wide for sanitary sewers up to 10 feet deep. For deeper sanitary sewers, the easement width should increase 2 feet for every vertical foot deeper than 10 feet. All easements shall be of uniform width, no variable width easements will be accepted. The Engineer may request wider easements if warranted.

All sanitary sewer easements shall extend to the far reaching property line of a given parcel of land. All sewers shall be centered in the easement unless water main is present. In that case, maintain minimum 10 ft. separation between water and sewer lines.

No sewer lines shall be placed in the public street rights-of-way unless specifically authorized by the Town. The construction of sanitary sewer lines

within drainage easements will not be permitted without the expressed written permission of the Town.

All plan sheets shall clearly identify the easement and the location of all other proposed utilities. The horizontal and vertical plans shall identify all utilities proposed to cross the easement. Regulated drain limits shall be shown on all plans.

B. Right-of-Way Plan Sheet

1. Geographic location map showing the extent of the project and including where applicable:
 - a. Directional North Arrow and Scale;
 - b. County;
 - c. Civil Township;
 - d. Section, Township and Range Identification;
 - e. Subdivision Names, Recording Information and Lot Numbers;
 - f. Highway, Road and Street Identification;
 - g. Rivers, Creeks and Named Ditches;
 - h. Assigned Parcel Numbers Arranged in Ascending, Numerical Order from the Project Beginning to End; and
 - i. List of Apparent Owners (last deed of record) by Assigned Parcel Numbers.
2. In addition to the above, there should be sufficient information on the design drawings to properly correlate with the right-of-way plan sheet; i.e., property lines, subdivision information, parcel number or name, width of right-of-way, permanent or temporary and special conditions; for example, structures, trees, shrubs to be removed or replaced, sodding, riprap, etc.

C. Legal Description Sheets

The following shall be provided:

1. Parcel Number;
2. Project Number;
3. Project Name;
4. Identification as to permanent or temporary easement;
5. Separate descriptions on separate sheets are required where both permanent and temporary easements are to be taken;
6. Metes and bounds descriptions shall be clear, concise and complete with sufficient detail to positively establish from known and referenced points, monuments, lines, etc. Total area should be stated at end of description, in acres;

7. Descriptions of easements from platted subdivision lots, including strips off sides of lots should include name of subdivision and recording information for the subdivision as well as affected lot number(s). NOTE: These are usually small areas; therefore, area should be stated in square feet; and
8. Registered land surveyor's licensed in the State of Indiana, seal and signature.

D. Property Plats

1. Parcel Number;
2. Project Number;
3. Project Name;
4. County;
5. Civil Township;
6. Section;
7. Township;
8. Range;
9. Owner;
10. Permanent or Temporary Legends;
11. Permanent or Temporary Easement Areas;
12. Total area of property out of which easement is to be taken;
13. Drawn By;
14. Directional North Arrow;
15. Scale;
16. Unplatted properties: complete boundaries of property description out of which easements are to be taken, including properly identified referenced corners, P.O.B.'s, monuments, roads, bearings, distances, etc.;
17. Platted subdivisions: dimensions of lot(s) as well as the lot number(s) and including the subdivision name and recording information;
18. Easement boundaries, including regulated drain boundaries, as described in Item A. of this subsection, including referenced bearings, distances,

etc., and identified as in legend; and

19. Registered land surveyor seal and signature.

5.05 Drafting Standards

A. General

These Standards have been established for the purpose of ensuring uniformity in the design and drafting techniques of projects to be submitted for review and acceptance.

1. All projects submitted, having more than two (2) sheets, shall have a title sheet which will include:
 - a. General Overall Area Map;
 - b. Vicinity Location Map;
 - c. A Site Plan map Detailing the Project;
 - d. Name/Title of Project, including Section Number if applicable;
 - e. Owner and Engineer's Name; and
 - f. Professional Engineer's Seal and Signature.
2. All plan and profile sheets are to be certified and dated by a professional engineer of the State of Indiana.
3. All sheets are to be numbered, with total number of sheets included.
4. Include detail sheet(s)/specification sheet(s), as applicable.
5. Design drawings shall be 24-inch by 36-inch.

B. Scales

The following scales for drawings are required:

1. Plan and Profile: Variable; Not to Exceed 1"=50' Horizontal and 1"=5' Vertical. A scale of 1"=30' is preferred for street and alley plans.
2. Cross Sections: 1"=5' Horizontal and Vertical

C. Materials

Mylar type drafting film shall be used for all reproduction "originals" to be submitted as record drawings. They shall be of a quality suitable for blueline printing.

D. Plan and Profile Sheets

1. General

- a. A North Arrow;
- b. The Scales Used;
- c. Project Name and Number, Sheet Number, Date Drawn, Date and Nature of Revisions;
- d. All topography in the area affected by construction;
- e. Right-of-Way lines; property lines and easements;
- f. Locations of bench marks and their descriptions;
- g. Locations of all existing and proposed utilities in the project area; and
- h. Match lines shall be easily identifiable.
- i. Length of service lateral and location of connection point to the sanitary sewer mainline. The connection point shall be measured from the downstream manhole and described on the plans in feet for each lateral.
- j. All future utilities including gas, water, electric, phone, cable, communications, etc. shall be shown on the plan.

2. Sewer Profile Drawings

All sewer profile drawings shall include the following, as a minimum:

- a. Existing and finished grade lines;
- b. Inverts at all manholes;
- c. Length and size of pipe between manholes;
- d. Slope of pipe in percent.
- e. Elevations to USGS datum;
- f. Top of casting elevations;
- g. Types of materials used;
- h. Profile of existing and proposed utilities; and
- i. Special construction required due to unfavorable soil conditions, jacked and bored casing pipe, etc.

3. Sanitary Sewer Lift Station Drawings

Lift station plans shall, at a minimum, contain the following:

- a. At least two views of the station, plan view and cross section;
- b. Electrical panel detail;
- c. Pump and alarm control elevations;
- d. Inlet and outlet pipe elevations;
- e. Finished grade and foundation elevations;
- f. Special construction required due to unfavorable soil conditions;
- g. Design pump capacity, rated horsepower, total dynamic head, manufacturer and model number;
- h. Sump capacity and cycle time;
- i. Also, the Owner's Engineer shall submit a copy of the head discharge curve and the complete design calculations for the lift station and force main; and
- j. Fence and access drive detail, if required.
- k. Control Building Detail

E. Specifications

Specifications for all sanitary sewer project submittals to the Town's Sewer Department shall not be required providing that the project plans include the following note on each sheet:

"This project shall be constructed in accordance with the most current version of the Town of Newburgh Sanitary Sewer Design and Construction Standards."

F. Record Drawings

All plans submitted as record ("as-built") drawings shall have all pertinent items shown on the plan view and properly scaled. This includes building laterals, manholes, valves, hydrants, inlets, etc. The information on the as-built plans shall be submitted under the same Drafting Standards as required in 5.05 of this section. All sheets shall have the phrase "as-built" or "record drawing" boldly printed on them with the date, and shall be stamped and signed by a professional engineer registered in the State of Indiana.

The as-built plans shall show the installed percent grade of the sewer, the installed horizontal distance from manhole to manhole, the installed rim and invert elevations for manholes. Lines not installed within the center of the

easement may need additional easement width prior to acceptance of the system. The final as-built plans shall show the final grade adjustments for all manhole rims.

The location of each sanitary sewer service lateral shall be accurately measured from the nearest down stream manhole. The lateral location must be shown graphically and the distance denoted on the as-built plan.

In addition to hard copy paper as-built drawing, computer generated plans for the as-built sewer system shall also be submitted on CD/DVD(s). The plans shall be submitted in either vector format (DWG, DXF files) or Portable Document File format (PDF files). See Section 2, Page 2-2, Item 18.

SECTION 6

MATERIALS

SECTION 6 MATERIALS

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SECTION 6

MATERIALS

6.01 General

This section provides a description of the materials acceptable for the construction of public works facilities. Use of other materials which are not specified herein shall only be permitted with the written approval by the Town and Town Engineer.

6.02 Gravity Sanitary Sewer

A. General

The following materials are acceptable for gravity sanitary sewers:

- Ductile Iron Pipe (DIP)
- Polyvinyl Chloride Pipe (PVC)
- Plastic Truss Pipe (PVC/ABS)

All pipe shall be the bell and spigot type with elastomeric seal joints.

All pipe shall be required to withstand a hydrostatic pressure of twenty (20) feet of water (8.6 psi) for two (2) hours while being deflected to the maximum amount recommended by manufacturer. Continuing the hydrostatic pressure, a shear load of one hundred (100) pounds per inch of nominal pipe diameter shall be applied to an unsupported spigot immediately adjacent to joint. During testing period, there shall be no visible leakage at joint.

B. Sanitary Sewer Pipe Materials

1. Ductile Iron Pipe (DIP)

All ductile iron pipe shall be cement coated and conform to the ANSI A21.51 and AWWA C 151, latest revisions. Ductile iron pipe shall be Class 350 for 8" through 12". For 14" through 18" Class shall be 250.

Fittings shall be standardized for the type of pipe and joint specified and shall comply with ANSI A21.10 and AWWA C110. Fittings shall be either mechanical joint or push-on type. Pipe joints shall use O-ring gaskets in accordance with ANSI 21.11 and AWWA C 111.

2. Polyvinyl Chloride Pipe (PVC)

a. Smooth Wall PVC

All pipe shall meet or exceed the requirements of SDR-26 pipe. All PVC pipe 15 inches or less in diameter shall meet the requirements of ASTM Designation D 3034. All PVC pipe greater than 15 inches in diameter shall meet or exceed the requirement of ASTM F 679. For diameters 15 inches or less, the pipe shall have a minimum cell classification of 12454-B and for diameters

greater than 15 inches, the pipe shall have a minimum cell classification of 12454-C with all pipe having a minimum tensile strength of 7000 psi as defined in ASTM D 1784.

All PVC pipe shall be tested in accordance with Standard Method of Test for External Loading Properties of Plastic Pipe by Parallel - Plate Loading, ASTM Designation 2412. Minimum pipe stiffness shall be 115 psi.

3. Plastic Truss Pipe (PVC/ABS)

All plastic truss pipe furnished under this Contract shall meet the requirements of ASTM Designation 2680 and ASTM D1784 for a minimum cell classification of 12454B or 12454C or ASTM D1788 for all classifications of 2-2-3. The fill material shall be Portland Cement, Perlite Concrete or other inert filler material exhibiting the same degree of performance.

All pipe shall be tested in accordance with the Standard Method of Test for External Loading Properties of Plastic Pipe by Parallel-Plate Loading, ASTM Designation 2412. Pipe stiffness shall be a minimum of 200 psi. All joints shall be gasketed and meet requirements of ASTM D3212 and ASTM F477.

C. Depth Restrictions on Pipe Materials

1. The depth limitations for the installation of the different pipe materials, unless a variance is approved by the Engineer, shall be as follows:
 - a. PVC Truss Pipe - 3' to 18'
 - b. ABS Truss Pipe - 3' to 18'
 - c. PVC Rubber Gasketed SDR 26 - 3' to 15'
 - d. Ductile Iron Pipe Class 50 - 3' to 28'
 - e. PVC C900 DR14 - 3' to 28'
2. Within each depth range, special pipe bedding requirements may be requested by the Engineer to insure adequate pipe support.

6.03 Sanitary Sewer Force Mains

A. General

The following materials are acceptable for sanitary sewer force mains:

- Polyvinyl Chloride Pipe
- Ductile Iron Pipe

B. Air/Vacuum Relief Valves

The design of sanitary force mains shall preclude the need for air vacuum relief valves. If high points cannot be eliminated an air relief valve shall be installed at

each point. Each valve shall be installed in a minimum 5' diameter precast concrete structure with a minimum depth of 5'. See detail on Figure 5-9D in Appendix A

C. Force Main Materials

1. Polyvinyl Chloride (PVC) Force Main

Type 1

PVC plastic pipe shall conform to ASTM Specification D 2241, Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe (SDR PR). The material used shall conform to ASTM Specification D 1784, Standard Specification for Rigid Polyvinyl Chloride and Chlorinated Polyvinyl Chloride compounds, Class 12454-B (PVC 1120). Pipe O.D. shall conform with that of steel pipe (IPS).

The pipe fittings shall be pressure rated in accordance with recommendations of the Plastic Pipe Institute. Pressure Class and Standard Dimension Ratios (SDR) shall be as follows:

Class 200 - SDR 21

Type 2

This pipe and fittings shall be PVC 1120 pressure pipe made from Class 12454-A or B material and conform with O.D. dimensions of steel pipe (IPS) or cast iron (C.I.). Pressure class and dimension ratio shall be as follows:

Class 200 - DR 14

Type 2 PVC shall comply with AWWA Standard C 900.

All plastic pipe and couplings shall bear identification markings in accordance with Section 2.5.2 and 2.5.3 of AWWA C 900, which shall include the National Sanitation Foundation (NSF) seal of approval. In addition, the plain end of each pipe length shall have two (2) rings, one (1) inch apart, painted around the pipe at the proper location to allow field checking of the correct setting depth of the pipe in the bell or coupling.

The Push-On Joint for PVC and joint components shall meet the requirements for ASTM Specification D 3139, Joint for Plastic Pressure Pipe Using Flexible Elastomeric Seals. The joint shall be designed so as to provide for the thermal expansion and contraction experienced with a total temperature change of seventy-five degrees Fahrenheit (75°F) in each joint of pipe. Details of the joint design and assembly shall be in

accordance with joint manufacturers standard practice.

Lubricant shall be non-toxic and shall not support the growth of bacteria and shall have no deteriorating effects on the gasket or the pipe. The lubricant containers shall be labeled with the manufacturer's name.

Gaskets shall meet all applicable requirements of ASA Standard A 21.11.

Gasket dimensions shall be in accordance with the manufacturer's standard design dimensions and tolerances. The gasket shall be made of such size and shape as to provide an adequate compressive force against the spigot and socket after assembly to effect a positive seal under all combinations of joint and gasket tolerances. The trade name or trademark, size, mold number, gasket manufacturer's mark, and year of manufacture shall be molded in the rubber on the back of the gaskets.

Gaskets shall be vulcanized natural or vulcanized synthetic rubber. No reclaimed rubber shall be used. When two (2) hardnesses of rubber are included in a gasket, the soft and hard portions shall be integrally molded and joined in a strong vulcanized bond. They shall be free of porous areas, foreign material, and visible defects.

2. Ductile Iron

All provisions of Section 5.02(B)(1) for Ductile Iron pipe for gravity sanitary sewers shall be the minimum criteria for material and specifications of Ductile Iron Force Main.

D. Locator Tape & Wire

Locator wire shall be #12 standard copper wire with thermoplastic insulation and capable of carrying 600 volts.

Marking tape shall be pigmented polyolefin film, three (3) inches wide, with a printed message on one side. Tape shall be a minimum of four (4) mils thick with a minimum tensile strength of thirty-five (35) pounds per three (3) inch wide strip. Tape shall bear a continuous printed message every sixteen (16) to thirty-six (36) inches reading "Caution - Buried Sewer Line Below". Color of plastic film shall conform to the latest edition of the "Recommended Standards for Wastewater Facilities" for color coding. Tape shall be "Terra Tape Standard 250" as manufactured by Reef Industries, Inc., Tape Products Division, Houston, Texas or approved equal.

E. Alternate Utility Location System

For "Cross Country" runs of force main, an alternate location system may be proposed. This system shall be an OMNI Marker Utility marking System or equal.

6.04 Sanitary Sewer Manholes/Wet Wells & Valve Pits

A. General

Location of manholes shall be as required in Section 5.02(D)(1).

B. Types of Manholes

Manholes shall be either monolithic (cast-in-place) or precast. If monolithic manholes are to be used, the Contractor shall submit drawings showing all reinforcement, dimensions, and connections for Town approval. All drawings shall be certified by a registered Professional Engineer.

C. Precast Manholes

Manholes shall be constructed in accordance with the ASTM Specifications for "Precast Reinforced Concrete Manhole Risers and Tops", Designation C 478. The minimum wall thickness shall be five (5) inches for manholes four (4) feet in diameter. The precast tops shall be of the eccentric cone type. Precast flat covers shall be not less than eight (8) inches thick and reinforced with two layers of steel with a minimum area of 0.39 square inches per linear foot in both directions in each layer. Precast flat bottoms of manholes shall also be reinforced the same as specified herein for precast flat top. Hoisting lugs or hooks shall be cast in place for handling and setting of the rings. Openings of proper sizes and suitable design shall be cast in place for receiving the sewer and/or drop pipes and connections. Adjusting riser rings shall be provided as approved by the Town.

No "see through" lift holes shall be allowed on precast concrete manholes 48 inches in diameter or less. All lift holes shall be thoroughly wetted and completely filled with non-shrink mortar or epoxy grout; then smoothed and covered, both inside and out, with a trowelable grade butyl rubber base backplaster material to ensure water tightness.

The exterior surface of all manholes shall be coated with a non-asbestos asphalt primer that meets Federal Specification SS-A-701B and ASTM D-41.

All manhole joints shall be tongue and groove and they shall be sealed with an O-ring conforming to ASTM C-443 or a ½" size butyl rubber base gasket material conforming to AASHTO M-198 and Federal Specification SS-S-210A manufactured by Hamilton Kent Seal or approved equal. Kent Seal mastic shall not be used in combination with O-ring gaskets.

D. Manhole Steps

For manholes deeper than 10' (as measured from bench to top of casting), steps shall be provided. The steps shall be manufactured of reinforced plastic and shall be twelve (12) inches wide and one (1) inch square.

E. Manhole Bases

Manhole bases shall be of cast-in-place monolithic concrete or precast concrete. Where sewer lines pass through or enter manholes, the invert channels shall be smooth and semi-circular in cross section and may be formed directly in the concrete of the manhole base, may be half tile laid in the concrete, or may be constructed by laying the sewer lines continuously through the manhole and break-hardened and neatly trimming the edges. When the sewer pipe end meets the concrete invert of the manhole base a smooth transition between the pipe material and concrete base must result. The Gap between the pipe and manhole base shall not exceed 1 inch. The gap shall be filled with non shrink grout to form a smooth transition. Changes of direction of flow within the manholes shall be made with a smooth curve with as long as a radius as possible. The floor of the manhole outside the channels shall be smooth and slope toward the channel not less than one (1) inch per foot.

No mortar or concrete shall be placed in water, and no water shall be allowed to flow over or against the concrete before it has set for a period of time deemed sufficient by the Town to prevent damage to the structure. The invert channel through manholes should be made to conform in shape and slope to that of the sewer. All invert channels are to have a properly mortared apron on either side, sloped to prevent solids deposition.

F. Adjusting Rings

Where one (1) solid riser or barrel section cannot be used, final adjustments in elevation of the frame and cover shall only be accomplished by the use of precast concrete adjusting rings conforming to ASTM C 478.

Rings shall be of a nominal thickness of not less than six (6) inches and not more than twelve (12) inches total of adjusting rings shall be allowed for adjustment of the manhole frame and cover to required elevation.

G. Sewer Pipe to Manhole Connections

To connect a sanitary sewer to a manhole, either a flexible boot KOR-N-SEAL 1 or 2, flexible connector, cast-in-place Dura-Seal gasket, "A"-lock gasket or an approved equal shall be used. Connections to an existing manhole shall be a flexible boot KOR-N-SEAL or approved equal.

If the flexible boot connection is used, it shall be placed in the reinforced concrete manhole base and secured to the pipe by a stainless steel clamp. Flexible connectors shall conform to ASTM C 923.

The cast-in-place inflatable gasket shall conform to ASTM C 923.

All connections shall provide for a watertight seal between the pipe and manhole. The connector shall be the sole element relied upon to assure a flexible watertight seal of the pipe to the manhole.

The rubber for the connector shall comply with ASTM C 923 and shall be

resistant to ozone, weather elements, chemicals, including acids and alkalis, animal and vegetable fats, oils and petroleum products.

The stainless steel elements of the connector shall be totally non-magnetic Series 305 stainless steel. The stainless steel clamp shall be capable of sustaining applied torque in excess of eighty (80) inch-pounds. It shall be the responsibility of the Contractor to submit details of the proposed connection to the Town for approval. Connections not approved by the Town shall be subject to removal and replacement with an approved adapter.

H. Castings

Standard manholes shall have the following frame and lid:

In Traffic:	Frame	Lid
East Jordan	1022-1 Ex. HD	1020 Type A Ex. HD
Neenah	R-1772-BVH	R-1772-BVH
In Grass:	Frame	Lid
East Jordan	1022-1 Med Duty	1020 Type A Med Duty
Neenah	R-1772-AVH	R-1772-AVH

Material shall be in compliance with ASYM A 48, CL 35B. Each lid shall have two (2) inch high letters indicating "Sanitary Sewer".

Where watertight castings are required, the manholes shall have the following frame and lid:

In Traffic:	Frame	Lid
East Jordan	1022-1 PT Ex. HD	1020 PT Type A Ex. HD
Neenah	R-1916-F	R-1916-F
In Grass:		
East Jordan	1022-1 PT Med Duty	1020 PT Type A Med Duty
Neenah	R-1916-F	R-1916-F

The frame shall be anchored to through the riser rings (if provided) to the cone section with four (4) galvanized rods. Each lid shall have two (2) inch high letters indicating "Sanitary Sewer".

I. Manhole Exterior Joint Collar

All manhole joints shall be installed with an exterior collar. The joint collar shall be MacWrap Exterior Joint Sealer as manufactured by Mar-Mac Manufacturing Company or an approved equal and shall be installed according to the manufacturer's recommendation. The collar shall consist of a band (9") wide. The band shall have an outer layer of polyethylene with an under layer of rubberized mastic that is reinforced with a woven polypropylene fabric. There shall be a peelable protective paper against the mastic that is removed when the collar is applied to the joint. Within the collar two steel straps 5/8" wide shall be located 3/4" from each edge of the band. The straps shall be in tubes that isolate them from the mastic and allow them to slip freely when tightened around the manhole.

J. Extrudable Preformed Gasket Material

A nominal ½-inch size butyl rubber base gasket material, conforming to AASHTO M-198 and Federal Specification SS-S-210A, may be used for adjusting ring grooves; between adjusting ring and cone; between cone and casting and between adjusting ring and casting. The gasket material shall be as manufactured by Hamilton Kent-Seal, RUB'R-NEK-L-T-M by K.T. Snyder Company or an approved equal.

K. Gate Valves

All cast iron gate valves shall meet AWWA C500. All valves shall have 125 psi flanges. All bolts shall be zinc coated. All gates valves shall have a hand wheel inside valve boxes and a 2 inch square nut with a valve box in buried locations.

L. Check Valves

Flapper shall be easily removed without need to remove valve from line.

The valve shall be designed for 175 PSI working pressure and shall be provided with an external lever and weight to facilitate back flushing.

M. Air Relief Valves

The minimum air relief valve shall be the APCO air relief valve Model No. 400 or approved equal.

6.05 Pavement Materials

A. General

All materials shall be obtained from a source(s) which currently supply similar approved materials for the Indiana Department of Transportation projects.

B. Concrete Pavement

All concrete pavement shall be composed of portland cement concrete, with or without reinforcement as may be specified, constructed on a prepared and compacted base course in close conformance with the INDOT Standard Specifications, Section 500, latest edition. Concrete pavements shall contain air entrainment and be finished with a broom-type finish.

C. Bituminous Pavement

Bituminous material for wedge and leveling, approaches, base, binder and surface shall be furnished in accordance with INDOT Standard Specifications, Sections 300, 400 and 610, as applicable.

Bituminous surface and base courses shall be Hot Asphaltic Concrete. Unless otherwise directed or permitted by the Town, the base mixture shall be No. 5LV with 4.3 percent asphalt or shall be Compacted Aggregate No. 53. Unless

otherwise directed or permitted by the Town, the surface mixture shall be size No. 11LV with 6.0 percent asphalt or No. 12 LV with 6.2 percent asphalt.

Bituminous binder shall be Hot Asphaltic Concrete, and unless otherwise directed or permitted by the Town, the binder mixture shall be size No. 9 LV with 4.8 percent asphalt or No. 11 LV with 5.0 percent asphalt.

Bituminous material for wedge and leveling shall consist of bituminous binder as set out above. Such material shall meet all requirements of Bituminous Binder as set out in the Standard Specifications Section 400.

Cover aggregate for type 2 or Type 5 seal coat shall be limestone chips.

Bituminous mixtures for approaches shall meet all the applicable requirements of Sections 400 and 600 of the Standard Specifications.

SECTION 7

SANITARY LIFT STATIONS

SECTION 7 SANITARY LIFT STATIONS

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SECTION 7

SANITARY LIFT STATIONS

7.01 General

This section pertains to the requirement for sanitary lift stations designed and constructed by an Owner/Contractor. The Town shall review and approve the use of any lift station. The Owner must show that it is not physically possible or economically feasible to provide gravity service into a public sewer.

All stations shall be submersible type, including a minimum of two (2) pumps (2) (duplex station) each with a minimum capacity of 300 GPM, 1750 RPM maximum, and a minimum six (6) inch force main. Voltage shall be sufficient for pump horsepower.

7.02 General Requirements

- A. All of the mechanical and control equipment shall be an integral package supplied by the pump manufacturer with local representation so as to provide undivided responsibility.
- B. The Contractor shall submit to the Town Engineer for review and approval two (2) sets of shop drawings, detailed specifications, pump warranty and performance characteristics for all of the equipment and fixtures to be furnished and installed. The shop drawings and equipment data shall be submitted with a cover letter or Contractor's stamp of approval, indicating that he has reviewed, checked and approved the data submitted. The Town Engineer will review the submittal and render a decision in writing as to the acceptability of the equipment.
- C. The Contractor shall provide the services of a factory service engineer to inspect the installation and alignment of all equipment and materials provided under this section. Upon completion of the installation and alignment, the service engineer shall certify to the Town, in writing, that the equipment furnished has been installed and aligned in accordance with all requirements, recommendations, and advisory instructions of the equipment manufacturer.

After the installation and alignment is complete, the factory service engineer shall operate the equipment for such a period as to assure the proper functioning of the same. All auxiliary equipment shall be operated to demonstrate that it is functioning properly. Any adjustments deemed necessary to place the equipment in proper operating condition will be made. Such adjustments shall be made at the Contractor's expense.

- D. The pump supplier shall have full-time service personnel and repair facilities at his place of business to be eligible as a pump supplier to the Town.
- E. The Contractor shall supply the services of a factory service engineer for one (1) day in addition to the time described above to provide on-site instruction to the

Owner's personnel in operation, routine maintenance, and "trouble shooting" for each piece of equipment furnished under this section.

- F. The manufacturer shall provide six (6) bound copies of a manual fully explaining the operation, routine maintenance and "trouble shooting" for all the equipment provided in this section. The manual shall include copies of all approved shop drawings with all required revisions. This manual must be submitted to the Town for approval prior to acceptance.
- G. Any exceptions to this Standard or associated approved Plans shall be submitted in writing and clearly stated. The exceptions must be approved by the Town prior to proceeding with the work.
- H. All components of the lift station that are exposed to weather shall be constructed of material that is resistant to corrosion and will not require surface protection throughout the expected life of the lift station. In general, these materials are stainless steel, aluminum, fiberglass reinforced polyester (FRP) and ultraviolet stabilized PVC.
- I. All pumps, valves and piping coming in contact with sewage or connected to the pump or valve chambers shall be coated as follows:
 - 1. Primer - Aromatic Urethane Zinc-Rich 2.5 - 3.5 mil
 - 2. Field Coats - Aliphatic Acrylic Polyurethane 2 coats at 2.0 - 4.0 mil per coator
Luberox two part paint with a 92% minimum solids content
- J. Inlet piping shall be located such that the sewage discharging into the wet well does not fall directly onto one or both of the submersible pumps.
- K. The interior wet well of the lift station shall be coated as follows:
 - 1. Field Coat:
 - a. Prime with Tnemec Series 435, Tk. 20.0 DFT
 - b. Finish with Tnemec Series 435, Tk 20.0 DFT

7.03 Operating Conditions

Prior to installation, the Contractor shall submit the following information for each pump to the Town Engineer for review and approval. Preference for high efficiency pumps will be considered.

- A. Pump Capacity in Gallons per Minute;
- B. Total Dynamic Head (TDH) and Operating RPM;
- C. Motor Horsepower;
- D. Motor RPM:

- E. Motor Voltage, Phase and Cycle;
- F. Make and Model Number; and
- G. Pump Curves for the Pumps to be Provided.

7.04 Product

- A. Furnish complete, a submersible lift station consisting of submersible, non-clog sewage pumps, a spare lower end for the pumps, motors, piping, valves, reinforced concrete wet well, electrical controls, guide system, and other appurtenances as specified in this section and as shown on the drawings. The spare lower end shall consist of the pump casing, seal housing, impeller and mechanical seals as to provide a complete pumping unit minus the pump motor, cable and discharge base. The spare lower end shall be stored in the lift station control building.
- B. Pumping Units shall meet the requirements of Hydraulics Institute (HI) standards.
- C. Pump materials shall meet the requirements of the latest editions of the following specifications:

<u>Material</u>	<u>ASTM or ANSI Designation</u>
Cast Iron	A-48 Class 30 or 35
Stainless Steel	ANSI Type 316L, 303, and 420

- D. Where applicable, specifications are not designed herein, supply high class commercial grades of materials that meet the requirements specified and which are satisfactory to the Engineer.

7.05 Pump Design

- A. Pumps shall be capable of handling raw unscreened sewage and 3" spherical solids.
- B. The design shall be such that the pump unit will be automatically and firmly connected to the discharge piping when lowered into place on its mating discharge connection which shall be permanently installed in the wet well.
- C. The pump shall be easily removable for inspection or service, requiring no bolts, nuts, or other fastenings to be disconnected. For this purpose, there shall be no need for personnel to enter the wet well.
- D. Each pump shall be fitted with a solid lifting ring permanently affixed to the pump and a stainless steel lifting chain of adequate strength and length to permit raising and lowering of the pump for inspection and removal. The lifting system

must permit the pump to be removed in one continuous motion, without intermediate hooking.

- E. The pump, with all its appurtenances and cable, shall be capable of continuous submergence under water without loss of watertight integrity to a depth of 65 feet.
- F. Pumps shall be designed to operate at an efficiency of 50% or greater unless otherwise approved by the Town.

7.06 Pump Construction

- A. All major static components (bearing housing, motor housing), shall be constructed of ASTM A48 Class 35 cast iron. The critical wear castings (pump casings, impeller, and seal housing) shall be constructed of a hardened iron with smooth surfaces devoid of blow holes and other irregularities. The critical wear castings for all new lift stations rated under 500 GPM shall have a Brinell Hardness of 300 or greater. The critical wear castings for all stations rated over 500 GPM shall have a Brinell Hardness of 400 or greater. If it can be shown that site conditions for a particular project do not warrant the higher Brinell Hardness requirement, an exception may be made if approved by the Town of Newburgh. All surfaces coming in contact with sewage shall be protected as specified under Paragraph 7.02. Coatings of any kind will not be considered as an equal to hardened castings. All exposed fasteners shall be 316Ti stainless steel.
- B. The wear ring shall consist of a stationary ring made of 400 series stainless steel with a BHR of 350 minimum. It shall be press fitted to the volute inlet.
- C. The impeller shall be a non-clogging design capable of passing 3" solids, fibrous materials, heavy sludge, and other matter found in normal sewage applications. The impeller shall be dynamically balanced. Static and dynamic balancing operations shall not deform or weaken it. The impeller shall be slip fit or tapered to the shaft and key driven. Non-corroding fasteners shall be used. The volute shall have smooth fluid passages large enough at all points to pass any size solid which can pass through the impeller and shall be centerline discharge.
- D. Pump shall be provided with a mechanical rotating shaft seal system consisting of two totally independent seal assemblies running in an oil reservoir having separate, constantly hydrodynamically lubricated lapped seal faces. The (lower) seal unit between the pump and the oil chamber shall contain one stationary and one driven rotating ring. The lower mechanical seal shall be specifically designed for slurry applications and both seal faces shall be silicone carbide.
- E. The upper seal shall be the manufacturers standard seal and operate in a oil filled chamber with drain and inspection plug (with positive anti-leak seal) for easy access. Proprietary seals will not be acceptable. Do not provide seals with the following characteristics: conventional double mechanical seals with single or multiple springs acting in opposed direction; cartridge type mechanical seals; seals with face materials other than those specified.

- F. The pump shaft shall be solid type 400 series stainless steel or a carbon steel shaft that is isolated from the pumped media and protected by a type 400 series stainless steel shaft sleeve.
- G. The cable entry water seal design shall be such that precludes specific torque requirements to ensure a watertight and submersible seal. The cables shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit with cable and housing; strain relief and sealing of the cable is done separately within the body; the cable entry junction chamber and the motor shall be separated by a stator lead sealing the gland or terminal board. Epoxy filled terminal housing shall be considered equal providing individual wire leads are spliced in the motor terminal housing and the individual splice caps are filled with epoxy; such construction shall not require a terminal board to isolate the motor interior and the pump top.
- H. All mating surfaces shall be machined and fitted with nitrile rubber O-rings where watertight sealing is required.
- I. Machining and fitting shall be such that sealing is accomplished by automatic compression in two planes and O-ring contact is made on four surfaces. Square rings which provide the controlled compression of an O-ring and the ease of assembly or a flat gasket shall be considered equal.
- J. Tolerances of all parts shall be such that allows replacement of any part without additional machining required to ensure sealing as described above.
- K. Each unit shall be provided with an adequately designed cooling system. Units which utilize an oil-filled motor and which operate considerably cooler than an air-filled motor shall not require additional cooling to be considered equally provided they utilize a heat shrunk or pressed assembly.
- L. Internal thermal sensors shall be required on each pump motor. Thermal sensors shall be used to monitor stator temperatures. There shall be one for each phase group in the motors. These shall be used in conjunction with and supplemental to external motor over current protection, and they shall be located in the control panel. The internal thermal sensors shall show and/or sound an alarm and automatically shutdown the pump before motor damage occurs.
- M. Moisture sensing probes shall be installed in the mechanical seal cavity of the pump unit. These probes shall sense the intrusion of the pumped liquid into the seal cavity, send a signal to the panel mounted alarm device. The alarm device shall be activated until the pump is removed from service/or repair. Pumps with seal failure in motor cavity will not be acceptable.

7.07 Guide System

- A. A sliding guide bracket shall be an integral part of the pump unit. The volute casing shall have a machined discharge flange to automatically and firmly connect with the cast iron discharge elbow which, when bolted to the floor of the

sump and discharge line, will receive the pump discharge connecting flange without the need or adjustment, fasteners, clamps, or similar devices.

- B. Installation of a pump unit to the discharge connection shall be one piece 90° elbow and result in a simple linear downward motion of the pump guided by two stainless steel guide rails.
- C. Guide rail pipes shall be constructed using 304 stainless steel Schedule 40. Intermediate rail supports shall be furnished in accordance with the manufacturer's recommendations and shall be constructed of 300 series stainless steel.
- D. No other motion of the pump unit, such as tilting or rotating, shall be required. No portion of the pump unit shall bear directly on the floor of the wet well. There shall be no more than one 90 degree bend allowed between the volute discharge flange and station piping.

7.08 Motor

- A. The pump motor shall be housed in an air-filled, or oil-filled, watertight casing and shall have moisture resistant Class F 155 degree C. insulation. All motors must utilize a pressed fit (heat shrunk) stator to assure perfect alignment for the best heat transfer. Thermal switches shall be embedded in the stator lead coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to the external motor overload protection and shall be connected to the control panel. The motor shall be NEMA design B and designed for continuous duty, capable of sustaining a minimum of 12 starts per hour. No motor winding damage shall result from operating the pumping unit out of its liquid environment for extended periods of time.
- B. Pump motor cable installed shall be suitable for submersible pump applications and this shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall conform to NEC specifications for pump motors and shall be of adequate size to allow motor voltage conversion without replacing the cable. Unless otherwise noted, provide adequate cable to complete the installation shown on the drawings.
- C. Submersible motors shall be built to Underwriters Laboratories, CSA Standards, Factory Mutual, and listed for Class 1, Division 1, Group C and D explosion proof hazardous locations as defined by the National Electric Code. All electrical parts shall be housed in a cast iron, water tight enclosure that is sealed by the use of O-rings and rabbeted joints with extra large overlaps.

7.09 Control Center

- A. It is the intention that this specification shall cover a complete Electrical Pump Control System as hereinafter described and all necessary appurtenances which might normally be considered a part of the complete electrical system of this

installation. All of the automatic control equipment is to be supplied by one manufacturer. It shall be factory assembled, wired, tested and covered by complete electrical drawings and instructions. Acceptable manufacturers are Control Works, Consolidated Electric, or pre-approved equal.

1. If the control center is outdoors, it shall be built in a NEMA 4X with drip shield, stainless steel enclosure and shall be suitable for the specified horsepower and voltage for the pumping equipment. NEMA 12 shall be used for panels mounted inside the control building. The outer door of the panel shall be hinged dead front with provisions for locking with a padlock. Inside shall be a separate hinged panel to protect all electrical components. H-O-A switches, run lights, circuit breakers, etc. shall be mounted such that only the faces protrude through the inside swing panel.
2. A circuit breaker and electronic starter shall be DANFOSS MCD 3000 Series, Square D Altistart 46, or Allen Bradley SMC plus with pump control option with 3 leg overload protection and manual reset shall be provided for each pump 25 HP and above and NEMA rated Square D starter for under 25 HP. Starters shall have auxiliary contacts, on three phase applications, to operate all pumps on override condition. A separate circuit breaker shall be supplied for power to the control circuit. The control center shall include an extra circuit breaker of adequate size to provide 115 volt, 1 phase power for the remote monitor panel, heater lights and one 15 AMP spare.

A solid state pump controller manufactured by EG Controls, Model DIGI-Gage 2300 or equal shall be provided for duplex and triplex pumping stations. The pump controller shall be highly reliable, versatile, easy to use and designed specifically for controlling the filling or emptying of tanks by one to four pumps. The controller shall accept 4-20mA DC or 1-5V DC from a continuous level or pressure transmitter and include the following:

Total of four outputs for one to four pump control;

Each output has independent ON and OFF points;

Digital indication of level and setpoints in desired engineering units;

Setpoints are adjusted from the front of the unit with no confusing programming required;

Front mounted LED output status indicators;

3-1/2 digit LED front mounted level readout;

The fill/empty action is field selectable for each control point via slide switches located within the unit. High and Low level alarms are included in the unit in addition to a Loss of Signal alarm indicated by the Low Level Alarm flashing;

The controller shall include a field adjustable 0.2 to 60 second time delay to inhibit control and alarm action upon startup;

The controller shall have the capability of being connected to additional units for multiple pump control from the same level signal.

3. A time delay shall be provided to delay start of second and third pumps should power outage occur.
4. The control center shall incorporate connections for heat sensors which are installed in the pumps. The connection shall disconnect the starter upon high temperature signal and will automatically reconnect when condition has corrected.
5. The control center shall incorporate connections for heat sensors which are installed in the pumps. The panel will have seal failure alarm light for each pump. This alarm indicates lower failure of the lower mechanical seal in the pump. This will be an alarm light only and will not shut down the pump.
6. The control center shall include a resettable type hour meter for each pump to register the elapsed operating time of each pump.
7. The control center shall have a high water alarm built-in the main enclosure. The high water alarm shall consist of a flashing alarm light with red Lexan plastic cover mounted on top of the enclosure such that it is visible from all directions. For panels mounted inside, a separate light shall be mounted outside in a NEMA 4X stainless steel box. An alarm horn shall be mounted on the side of the enclosure. A push to test horn and light button shall be mounted on the inside of the panel. A push to silence horn button shall be provided and mounted on the side of the enclosure.
8. The control center shall include a condensate heater to protect against condensation inside the enclosure, if installed outside.
9. The control center shall include lightning protection.
10. The control center shall include a phase monitor relay to shut down the control circuit and protect the equipment due to loss of phase or phase reversal.
11. The control center shall be suitable for connection to a future, non-hardwired remote monitor package. The main control must include the following interconnection capabilities equipment:

- a. Standby UPS system with surge and noise suppression manufactured by Tripp Lite, Model BC Pro 550 for lift stations rated less than 500 GPM. For lift stations rated at 500 GPM or higher, a micro-processor based surge protection unit shall be used. by Sola/Hevi Duty or approved equal.
 - b. Circuit breaker to power remote monitor as described above.
 - c. Relay contact to signal high water alarm.
 - d. Relay contact to signal tripping of the overload of any of the pumps.
 - e. Relay contact to transmit signal of seal failure of any of the pumps.
 - f. Relay contact to indicate each pump is running. Contacts shall operate off motor current draw.
 - g. Backup float terminals.
- 12. All components of the control center shall be American made and available from local sources. In particular, items such as circuit breakers, overload protection, relays, etc. shall be available and in stock by local sources.
 - 13. Submersible Wet Well Level Sensing Transducer, the pump controller shall receive a 4-20mA signal from a submersible level transmitter located in the wetwell. The level transmitter shall be provided with a measuring range of either 0-10 feet or 0-30 feet. The pressure level transmitter shall be designed for measurement in liquids with suspended solids such as sewage and sludge. The transmitter shall be of the diaphragm stainless steel type and provided with steel reinforced cable for withstanding tensile stress. The transmitter cable shall be provided with a polyethylene compensation tube. The transmitter housing shall be designated so that solids do not adhere to it. Accuracy shall be 0.5% of full scale. Transmitter shall be DANFOSS PRESLEV Model 1100 series or approved equal.
 - 14. Two Backup High Water and Low Water Mercury Float Switches with intrinsically safe barrier. UL listed for 508-14 classification.
 - 15. Each new lift station control panel shall be equipped with a "Test Light" button clearly identified on the front of the panel. This button should provide the Town's personnel with the ability to determine whether or not any light bulbs have burned out.
 - 16. UL Approval. The control panels shall be constructed in compliance with Underwriter's Laboratories Industrial Control Panels listing and follow-up

service, utilizing UL listed and recognized components where applicable. The control panels shall bear the Underwriter's Laboratory listed serialized label. The panel shall be UL 508/698A approved.

17. Remote Monitor Package. The station shall be equipped with a Remote Monitor capable of monitoring the status of the lift station and communicating with the existing telemetry system housed at the Wastewater Treatment Plant. The contractor shall install a telephone line in conjunction with the control panel to monitor operating conditions at the station. The telemetry system shall automatically initiate contact with pre-described telephone numbers. An eight channel dialer (Sensaphone Model 1108) shall be included. A single dedicated 115 volt receptacle shall be provided to the power unit. Ten AMP form "C" dry contacts run to numbered terminal strips will be included as follows:

- Low Level
- High Level
- Pump 1 Seal Fail, Overload Trip
- Pump 2 Seal Fail, Overload Trip
- Power Failure
- Pump 1 Over Temperature
- Pump 2 Over Temperature
- High Noise Level

The sensaphone shall be configured by the contractor for the following alert conditions:

- 1). Power Failure
- 2). High / Low Water Level
- 3). Pump 1,2,3 Fail
- 4). Backup System Active
- 5). Transducer Fail
- 6). VFD 1,2,3, Failure
- 7). Backup High/Low Water Level
- 8). Generator on Line.

- Temperature
- High Noise Level.

18. Operation and Maintenance Manuals. Four (4) operation and maintenance manuals shall be submitted to the city. Manuals shall include at a minimum, operation instructions, maintenance instructions, recommended spare parts list, lubrication schedules, structural diagrams, as-built wiring diagrams and bill of materials.
19. Shop Drawings: Two (2) complete sets of shop drawings shall be supplied to insure successful installation and operation of the control system. The shop drawings shall consist of all of the following:

- Sufficient detail to evaluate compliance with these specifications.
 - A detailed component list including manufacturer and catalog number.
 - A custom wiring diagram for this specific application to facilitate and insure accurate field connections to the control panel by electrical installation personnel.
 - A description of operation for control system.
 - An enclosure dimension print.
20. Guarantee: All equipment shall be guaranteed against defects in material and workmanship for a period of one (1) year from date of Owner's final inspection and acceptance to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the Owner.
21. A Nema 4X (aluminum or stainless steel) junction box with terminal strip construction is required. Minimum box dimensions shall be 2' x 2' X 8". A minimum of two (2) stainless steel or aluminum pedestal type mounting stands each with louvered vent are also required. Minimum pedestal dimensions shall be 6" X 6" X 2'. The junction box is to be mounted on top of the pump wet well via stainless steel anchor bolts, and is to contain individual gas tight cord grips sized for the O.D. of each pump and float cord. One (1) pedestal is to exclusively house the floats cords and the other pedestal is to house the pump cords. Conduit shall be used to encase the pump and float cords from the junction box to the control panel. The minimum size to be used for all conduit shall be two (2) inches I.D. Beginning at the control panel, all conduits shall pass through the concrete floor of the control building and continue underground to the wet well where it will penetrate the wall of the wet well and proceed up through the flat top of the wet well into the pedestal and on to the junction box. A duplex station shall require two (2) conduits for the pump cords and one (1) conduit for the floats for a total of three (3) conduits. A triplex station shall require three (3) conduits for the pump cords and one (1) conduit for the floats for a total of four (4) conduits.

7.10 Other Lift Station Work

- A. Other work required to complete and satisfactory installation shall include, but not limited to:
1. Provide precast concrete wet well and valve vault.
 2. Provide discharge piping as shown on the drawings.
 3. The contractor shall furnish and install a flow monitoring manhole over the

force main, leaving the pipe exposed so that flow monitoring equipment may be installed at a later date. See details for "Typical Lift Station Plan" and "Sanitary Manhole Installed Over Existing Sewer".

4. Mount new disconnect, duplex control panel and light on new stand.
5. Provide wiring between utility power pole, new control panel and wet well. Note: The electrical conduit going from the control panel to the wet well shall be constructed such that there is a positive slope toward the wet well and the ends of the conduit shall be sealed to prevent moisture entry.
6. Provide temporary piping and wiring necessary to maintain existing service during construction activities (if applicable).
7. For construction of all new lift stations in which the contribution of sewer flows will be generated from new construction, the design shall include conduits for chemical feed piping from the lift station wet well to the control building. The conduit shall be adequately sized to accommodate a 1/2" diameter polypropylene chemical feed line.
8. All newly constructed lift stations shall have a new standard metering manhole installed as detailed in Appendix A. Placement of the standard metering manhole shall be as per Appendix A. The manhole shall be located a minimum distance of 10 force main pipe diameters away from any pipe bend or fitting.

7.11 Wet Well and Valve Pit

A. General

1. The walls of the pump station and valve pit structures shall be constructed of reinforced concrete pipe which shall conform to the latest ASTM Specifications C-76, with a minimum compressive strength of concrete equal to 4000 PSI. Reinforcement of the pipes shall be of the circular type. All of the pipe for the pump chambers and the access tubes shall be Class III and of the diameter shown on the plans. Handling or lifting lugs and/or devices shall be provided in the pipe shells or ease or unloading and setting in place. All joints between pipes and between ends of pipes and concrete slabs shall be made watertight.
2. The pipes utilized for the pump station wet well or valve pit shall be jointed with a rubber O-ring type seal conforming to the ASTM Standard C-443 (latest revision). The joint shall be designed to provide a maximum infiltration/exfiltration limit of .158 gallons (200 gpd/in-mile). The interior and exterior joint spaces shall be grouted to a smooth surface using a sand-cement mixture mortar.

The mortar-grout shall have one part cement to two parts sand mix ratio. The complete interior and exterior joints shall have a smooth troweled waterproof finish. The exterior joint shall be further protected by a joint collar properly secured in accordance with the manufacturer's recommendations. The top concrete slab of the pump station and valve pit shall have a cast into it a socket for receiving the end of each concrete pipe. The joint shall be made watertight. An access ladder shall be

provided with rungs spaced twelve (12) inches on center from top to bottom of the station and shall be of welded steel construction, and hot-dipped galvanized after fabrication of aluminum.

Concrete for the foundation and roof slabs shall be made of Class A concrete.

3. Access Hatches - The Contractor shall furnish and install access hatches for both the wet well and valve pit. All required hatches shall be aluminum, rated for 300 lbs. per square foot live load, and be complete with: frames; stainless steel hinges with stainless steel tamper proof bolts and nuts; staple for a padlock; flush aluminum drop handle, stainless steel automatic hold open arms with vinyl grips to lock the covers in the open position; and stainless steel springs for ease of opening. The pump hatch is to be a two (2) door and sized so there is at least a 2" clearance when the pump is installed or removed through the hatch opening. The valve hatch is to be a minimum size of 36" X 36" and single door construction. All hatches shall be stamped in two places with 3/8 inch letters with the words "**PROPERTY OF NEWBURGH, IN**". One stamping is to be placed on frame of hatch so that it is visible from the outside. The other shall be on the underside of the door.
4. Pipe, Valves and Fittings - The suction and discharge pipe fittings shall be ductile and cast iron Class 150. Inside pipe and fittings shall be flanged. Bell end pipes or fittings with mechanical joints shall be provided at or near the outside face of the station well. Piping shall be supported independent of the sewage flanges. All inside plug valves shall be provided with handwheels. All check valves shall be rubber flapper type with external lever and weight as specified in Section 6.

All metal piping other than cast or ductile iron and copper tubing shall be galvanized steel pipe.

Sewer pipe entering the wet well and force main pipe entering and leaving the valve vault shall be provided with a flexible boot seal, similar to the requirement for manhole entry, to prevent groundwater entry into the lift station.

7.11.1 Control Building

A. General

1. The control building dimensions shall be 10'-0" x 10'-0" (ext. to ext.) with an 8'-0" ceiling height.
2. A reinforced concrete foundation shall be provided to adequately support the proposed structure.
3. This structure shall house the pump controls and provide a weather proof environment for accessing these controls.
4. An asphalt access drive shall be provided.

B. Building Notes

1. Minimum door dimensions shall be 3'-6"x7'-0"x1 3/4".
2. The door shall include a (3) hinge arrangement.
3. The door shall be installed in a manner that does not block the view of the wet well when open at 90 degrees to the building.
4. The door shall come complete with a hasp for a padlock.
5. The door shall have an aluminum threshold.
6. The door shall be fabricated of 16 gauge steel and include a 2'-0" x 2'-0" louvered vent.
7. The door frame shall be steel.
8. The control building shall comply with all local and state building codes.
9. The control building shall include a minimum of (1) overhead light with a switch located at the door.
10. A minimum of (2) outlet boxes shall be provided and installed complete, (1) inside & (1) outside, with each on its own individual breaker.
11. All lumber utilized for construction of the control building shall be #2 grade.
12. (1) exterior light shall be provided and installed complete in the wall immediately facing the wet well. This light shall be Lithonia #TWH100M 100 watt metal halide wall pak complete with lamp and photocell control - 120v. Provide with dark bronze finish.
13. 12" heavy duty exhaust fan with temperature and humidity controls shall be installed through the brick veneer. An aluminum frame gravity shutter shall be installed on the exterior.

C. Wall Construction

1. The control building walls shall be constructed of 2"x4" studs at 16" on center.
2. The exterior wall finish shall be 4" brick veneer (color selected by owner - Town of Newburgh).
3. Brick shall be mounted on either 1/2" fiberglass or plywood sheathing.
4. 20 gauge galvanized corrugated wall ties at 16" on center both vertical and horizontal.
5. (1) 36"x36" wire reinforced safety glass window shall be centered in the wall facing the wet well.

D. Roof Construction

1. 215# fiberglass shingles shall be utilized for construction (color selected by owner - Town of Newburgh).
2. 5/8" decking with clips shall be utilized for construction.
3. 15# building felt with 2" lap shall be utilized for construction.

4. A drip edge is required.
5. The control building roof shall be constructed of 2"x4" rafters at 16" on center, and 2"x4" ceiling joists also at 16" on center.
6. A continuous ridge vent shall be provided.
7. An aluminum soffit with a continuous vent shall be provided.
8. 1"x4" aluminum clad fascia boards are required.
9. 4" aluminum gutters and downspouts shall be required. Concrete splash pans shall be provided.

7.12 Station Warranty

- A. Station warranty shall be one (1) year from the date of acceptance per Town maintenance bond requirements.

SECTION 8

INSTALLATION/CONSTRUCTION

SECTION 8 INSTALLATION/CONSTRUCTION

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SECTION 8

INSTALLATION/CONSTRUCTION

8.01 General

This section shall provide general, minimum requirements for the installation and construction for Town of Newburgh Public Works projects.

8.02 Excavation

A. Dewatering and Control of Surface Water

Where groundwater is encountered, the Contractor shall make every effort necessary to secure a dry trench bottom before laying pipe. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, well points, etc. necessary to depress and maintain the groundwater level below the base of the excavation. If the Contractor is unable to remove the standing water in the trench, the Contractor shall over-excavate the proposed bottom grade of the sewer bedding, and place not less than three (3) inches of Class No. 2 crushed stone (Indiana Department of Transportation aggregate Classification) in the over-excavated area.

The Contractor shall keep the site free of surface water at all times and shall install drainage ditches, dikes, pumps and perform other work necessary to divert or remove rainfall and other accumulation of surface water from excavations. The diversion and removal of surface and/or groundwater shall be performed in a manner which will prevent the accumulation of water within the construction area.

UNDER NO CIRCUMSTANCES SHALL SURFACE WATER AND/OR GROUNDWATER BE DISCHARGED TO, DISPOSED OF, OR ALLOWED TO FLOW INTO THE TOWN'S SANITARY SEWER SYSTEM.

B. Excavation

1. Clearing

Preparatory to excavation, the site of all open cut excavations, embankments, and fills shall be first cleared of obstructions and existing facilities (except those which must remain temporarily or permanently in service). On all public or private property where grants or easements have been obtained, and on the property of the Town, the Contractor shall remove and keep separate the top soil, and shall carefully replace it after the backfilling is completed.

2. Pavement Cutting

Prior to excavating paved areas all excavation edges falling within the pavement shall be saw cut in a neat, straight manner. Cutting shall be performed with a saw designed specifically for this purpose. The cut shall penetrate the entire pavement thickness where possible. If the existing pavement is more than 6 inches thick, then a cut of not less than 6 inch depth shall be made. If pavement cuts are made in streets which are opened to traffic prior to excavation, then the cuts shall be thoroughly filled with sand and maintained full until the excavation is performed.

3. Protection of Existing Improvements

Before any excavation is started, adequate protection shall be provided for all existing utilities and Town structures.

4. Protection of Trees and Shrubs

No existing trees or shrubs in street right-of-ways and easements shall be damaged or destroyed. Where branches of trees or shrubs interfere with the Contractor's operations, they shall be protected by tying back wherever possible. No limbs or branches shall be cut. If his operations will not permit saving certain trees, the Contractor shall be wholly responsible for satisfying all claims for restoration or restitution resulting from their damage or removal.

If small trees and shrubs are moved or pruned to permit more working space, pruning shall be done in accordance with Home and Garden Bulletin No. 83, U.S. Department of Agriculture, "Pruning Shade Trees and Repairing Their Injuries". However, the Contractor shall obtain, in writing, the Town's permission to move or prune trees or shrubs.

5. Maintenance of Public Travel

The Contractor shall carry on the work in a manner which will cause a minimum of interruption to traffic, and may close to through travel not more than two (2) consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, the Contractor shall provide suitable bridges to street intersections and driveways. The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Prior to closing of any streets the Contractor shall notify responsible municipal authorities.

All traffic control shall be in accordance with the latest edition of the Indiana Manual on Uniform Traffic Control Devices (MUTCD).

6. Utility Interruption

The Contractor shall proceed with caution in the excavation and preparation of the trench or pit so that the exact location of underground structures may be determined. Prior to proceeding with trench excavation the Contractor shall contact all utility companies in the area to aid in locating their underground services.

The Contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, he shall immediately notify the responsible official of the organization operating the utility interrupted. The Contractor shall lend all possible assistance in restoring services and shall assume all costs, charges, or claims connected with the interruption and repair of such services.

7. Open Cut Excavation

Open cut excavation shall be safely supported and of sufficient width and depth (and only to such width and depth) to provide adequate room for the construction or installation of the work to the lines, grades and dimensions.

a. Trench Dimensions

The bottom width of the trench at and below the top of the pipe and inside the sheeting and bracing, if used, shall not exceed the recommendations as contained in the applicable ASTM Standard for the pipe being used.

Trench sheeting and bracing or a trench shield or box shall be used as required by the rules and regulations of OSHA. The bottom of the trench shall still meet the above standards.

If the trench widths are exceeded with the written permission of the Town, the pipe shall be installed with a concrete cradle or with concrete encasement or other ASTM approved methods as approved by the Town Engineer.

b. Excavations With Sloping Sides, Limited

The Contractor may, at his option, where working conditions and right of way permit (as determined by the Town Engineer), excavate pipe line trenches and pits for structures with sloping sides, but with the following limitations:

- (1) In general, only braces and vertical trenches will be permitted in traveled streets, alleys, narrow easements and for pit excavations more than 10 feet deep.

- (2) Where pipe line trenches with sloping sides are permitted, the slopes shall not extend below the top of the pipe, and trench excavations below this point shall be made with near vertical sides with widths not exceeding those specified herein before.
- (3) Slopes shall conform to all OSHA regulations.

8. Earth Excavation

Earth materials shall be excavated so that the open cuts conform with the required lines, grades and dimensions.

- a. Unsuitable Foundation: When the bottom of the excavation is unsuitable as a foundation, it shall be excavated below grade and then refilled with concrete or crushed stone to the grade as the Town or its representative may direct. The crushed stone refill shall be mechanically compacted in six (6) inch layers or as directed by the Town.
- b. Unauthorized Excavation: Unauthorized excavation below grade shall be filled with crushed stone or concrete and compacted as ordered and directed by the Town or its representative.
- c. Excavated Earth For Backfill: Excavated earth materials may be used for backfill subject to the approval of the Town Engineer. Such material may be used only where its class is allowed.

9. Boring and Jacking

Construction of the pipeline by boring and jacking methods under highways, railroads, and streams will be permitted unless otherwise specified on the plans.

- a. Backstop: The backstop shall be of sufficient strength and positioned to support the thrust of the boring equipment without incurring any vertical or horizontal displacement during such boring operations.
- b. Guide Rails: The guide rails for the boring equipment may be of either timber or steel. They shall be laid accurately to line and grade and maintained in this position until completion of the boring operations.
- c. Casing Pipe: Steel casing pipe shall be new, conform to ASTM A 139 and shall be of the size (diameter) sufficient to install and support the carrier pipe. The lengths of pipe shall be welded as they are installed. Where lengths of casing pipe are joined during the boring operations, care shall be taken to insure that the proper line and grade is maintained.

The minimum wall thickness for casing pipes under highways, railroads and streams shall be 0.375 inches. Steel shall be Grade B under railroads and Grade A at all other locations. Stream crossings shall be a minimum of 3 feet from the stream bottom (as defined by the regulating agency) and the top of the casing pipe.

10. Water Line Protection

- (a) Horizontal and Vertical Separation - Sewers shall be laid at least 10 feet (3 m) horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot (3 m) separation, the appropriate reviewing agency may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the sewer closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18 inches (460 mm) above the top of the sewer or lateral.

If it is impossible to obtain proper horizontal and vertical separation as described above, both the water main and sewer must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards of the agency and be pressure tested to 150 psi (1034 kPa) to assure watertightness before backfilling.

- (b) Crossings - Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches (460 mm) between the outside of the water main and the outside of the sewer or lateral. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to maintain line and grade.

When it is impossible to obtain proper horizontal and vertical separation as stipulated above, one of the following methods must be specified:

- (1) The sewer shall be designed and constructed equal to water pipe, and shall be pressure tested at 150 psi (1034 kPa) to assure water tightness prior to backfilling.
- (2) Either the water main or the sewer line may be encased in a watertight carrier pipe which extends 10 feet (3m) on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be

of materials approved by the regulatory agency for use in water main construction.

8.03 Bedding and Backfill

A. General

All trenches or excavations shall be backfilled to the original surface of the ground or such other grades as required or directed. In general the backfilling shall be carried along as speedily as possible in order to avoid open excavations.

B. Backfill Materials

The following materials shall be used for backfill in accordance with and in the manner indicated by the requirements specified herein.

Class I - Angular, 6 to 40 mm (1/4 to 1 1/2 inch), graded stone such as crushed stone.

Class II - Coarse sands and gravel with maximum particle size of 40 mm (1 1/2 inch), including various grades of sands and gravel containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.

Class III - Fine sand and clayey gravel including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil types GM, GC, SM and SC are included in this class.

Class IV - Silt, silty clays and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH and CL are included in this class. These materials are not recommended for bedding. This class shall also include any excavated material free from rock (3 inches and larger), concrete, roots, stumps, rubbish, frozen material and other similar articles whose presence in the backfill would cause excessive settlement.

C. Backfill of Trench Excavations for Pipes and Conduits

Bedding and Backfill materials samples shall be submitted to the Town prior to start of construction.

D. Bedding

1. Rigid Pipe and Conduit Bedding

For purposes of this specification, rigid pipe and conduits shall include those made of ductile iron and other materials as determined by the Town.

All rigid conduit and pipe shall be laid to the lines and grades unless otherwise directed by the Town. All rigid conduit and pipe shall be bedded in compacted Class I or II material, placed on a flat trench bottom. The bedding shall have a minimum thickness of 4" or one-fourth (1/4) the outside pipe diameter below the pipe and shall extend halfway up the pipe barrel at the sides. All material shall be placed in the trench in approximately six (6) inch layers. Each layer, shall be leveled and evenly distributed on both sides of the pipe so as not to disturb, displace or damage the pipe and shall be thoroughly compacted. When Class I or II materials are used compaction may be accomplished by hand or mechanical tamping or by "walking" the material in. Bedding from the halfway point on the pipe to a point twelve (12) inches above the top of the pipe shall be a Class I, II, III, or IV material placed in six (6) inch layers and thoroughly compacted to prevent settlement. Class III and IV material shall not be used when the trench is located in an area subject to vehicular traffic.

2. Flexible and Semirigid Conduit Bedding

For purposes of this specification, flexible and semirigid conduits and pipes shall include those made of PVC, HDPE, PVC Truss, and other materials as determined by the Town Engineer.

All flexible and semirigid pipe shall be laid to the lines and grades unless otherwise directed by the Town. All flexible and semirigid conduit shall be bedded in compacted Class I or Class II material, placed on a flat trench bottom. The bedding shall have a minimum 4" thickness or one-fourth (1/4) the outside pipe diameter below the pipe and shall extend to twelve (12) inches above the top of the pipe level the full width of the trench. All material shall be placed in the trench in a maximum of six (6) inch layers (before compaction). Each layer, shall be leveled and evenly distributed on both sides of the pipe so as not to disturb, displace or damage the pipe and shall be adequately compacted. When Class I materials are used compaction may be accomplished by hand or mechanical tamping or by "walking" the material in. When Class II materials are used, compaction shall be accomplished by hand or mechanical tamping to a minimum ninety percent (90%) Standard Proctor Density (or per the manufacturer's recommendation, whichever is greater) to meet the maximum allowable deflection of five percent (5%). Compaction will be verified through testing by a certified, independent laboratory at one location along the pipe between structures. Testing will not be required if Class I material is used.

E. Backfill Above Pipe

1. Method A Backfill in Areas Not Subject to Vehicular Traffic

For purposes of this specification, trenches shall be considered subject to vehicular traffic if all or any portion of the excavation is located within four (4) feet of a roadway or alley which is routinely traveled by powered vehicles. In the event of any question regarding the susceptibility of an area to traffic, the Town's decision shall govern.

The trench between a level twelve (12) inches above the top of the pipe and the ground surface shall be backfilled with Class I, II, III or IV materials, as described above, deposited with mechanical equipment in such a manner that it will "flow" onto the bedding and not free fall. The Contractor shall consolidate the backfill by the back and forth travel of a suitable roller, wheeled device or other similar heavy equipment until no further settlement is obtained. Heavy equipment shall not be used until there is a cover of not less than three (3) feet over the pipes. To assist in promoting maximum settlement, the surface of the trench shall be left in a slightly rounded condition. Periodical dressing of the backfill in the trench to promote the drainage and safety conditions shall be made during the course of the work.

2. Method B Backfill in Areas Subject to Vehicular Traffic (Mechanical Compaction)

The trench between a level of twelve (12) inches above the top of the pipe and the surface, which are located in areas subject to or possibly subject to vehicular traffic, shall be backfilled with Class I or II materials. The initial lift of backfill shall be placed in a manner to minimize lumps and voids, but not requiring mechanical tampers. Equipment for compaction shall be used on backfill after there are two (2) feet of backfill over pipe barrel. Additional lifts of no more than six (6) inches in depth shall be placed and compacted with compaction equipment to a depth of twelve (12) inches below finished grade. Completion of backfill to finished grade shall be done with compacted aggregate. Compacted aggregate shall conform to the Indiana Department of Transportation Standard Specifications for Compacted Aggregate Base. The aggregate shall be thoroughly compacted by means of compaction equipment. The compacted aggregate is intended to serve as the base for the permanent pavement replacement. Any settlement that occurs shall be immediately refilled and compacted with aggregate. The Contractor shall apply an approved dust preventative as necessary to avoid or eliminate dust complaints from nearby residents.

All backfill placed under this Method B shall be tested in accordance with AASHTO-7-99 and immediately prior to permanent pavement replacement. Compaction shall not be less than ninety-five percent (95%) Standard Proctor Density.

F. Temporary Surfaces Subject to Traffic

The Contractor shall open streets to traffic immediately after completing the backfill operation. He shall accomplish this by installing the compacted aggregate base immediately after granular backfill. The use of Class II backfill as a temporary surface is specifically prohibited.

G. Maintaining Trench Surfaces

All surface settlement of the backfill along trenches located beneath streets, roads, alleys, driveways and parking lots which are subject to traffic shall be kept filled level with or slightly above the original paved surface at all times with compacted aggregate base material until the permanent pavement is satisfactorily restored. When temporary asphalt pavement is used, depressions and "pot holes" shall be promptly filled with the temporary asphalt material. Special attention shall be given by the Contractor to the timely and proper maintenance, leveling and grading of the surface of all backfilled trenches, especially those subject to traffic and especially following rains. The surface of streets, roads and alleys shall be maintained smooth and free of ruts and water trapping depressions by periodic power blading, scarifying; and/or filling settled areas, ruts, pockets, or holes with compacted aggregate base material or temporary asphalt where used.

As a dust preventive, the Contractor shall apply, calcium chloride over the surface of the compacted aggregate base in such amounts and at such times as are necessary to avoid or eliminate dust complaints from nearby residents. In event of any question regarding the existence or nonexistence of a dust nuisance, the Town's decision on the matter will govern. The material used shall be Regular Flake Calcium Chloride having a minimum chemical content of Calcium Chloride of seventy-seven percent (77%). Unless otherwise specified or ordered by the Town, the rate of application shall be one and one half (1 ½) pounds per square yard of surface covered.

Wherever surface settlement is not important, unless otherwise specified or directed, the backfill shall be neatly rounded over the trench to a sufficient height to allow for settlement to grade after consolidation. Just prior to the completion of all work under the contract, any surface settlement below original ground surface shall be refilled in a satisfactory manner, and reseeded as specified if required.

8.04 Laying of Sewers

A. General

This section on the Laying of Sewers shall be divided into two (2) classifications - rigid and nonrigid conduit. Pipe materials such as reinforced concrete, steel, and ductile iron pipe are considered rigid conduits. Thermoplastic (PVC) pipe, corrugated metal pipe, HDPE, and PVC truss pipe shall be considered nonrigid or flexible conduits.

B. Rigid Conduit Installation

All rigid conduit for sewer pipe shall be laid to the lines and grades, unless otherwise directed by the Town Engineer. All rigid pipe shall be laid in accordance with the details for the First Class Pipe Laying Method. This First Class Pipe Laying Method may be achieved by Class B bedding methods as shown in the ASCE Manual of Practice No. 37, latest edition. Under this Class B bedding Method, the pipe shall be bedded in compacted granular material (Class I or Class II) placed on a flat trench bottom. The bedding shall have a minimum thickness of one-fourth (1/4) the outside pipe diameter below the pipe and shall extend halfway up the pipe barrel at the sides. All granular bedding material shall be placed in the trench in approximately six (6) inch layers. Compaction shall be accomplished by hand or mechanical tamping or by "walking" the granular material in. From the halfway point on the pipe (Springline) to a point twelve (12) inches above the top of the pipe, backfilling methods A or B or C shall be used depending on the trench location. In addition, all rigid conduit shall be installed in accordance with "Standard Recommended Practice for Installing Vitrified Clay Sewer Pipe" (ASTM Designation C 12 and ASTM D2321).

The laying of pipe in finished trenches shall be commenced at the lowest point, proceeding upstream, with the spigot ends pointing the direction of flow. No blocking under pipes will be permitted, except as approved by the Town for pipe to be encased in concrete or laid in concrete cradles.

The practice of blocking pipe up to grade with bedding material, then backfilling under is prohibited. The entire length of the bed section is to be at proper grade before installing pipe.

The supporting strength of the pipe is dependent upon its foundation and trench width. To develop normal strength, the pipe shall have a firm uniform foundation under the entire lower quadrant of the barrel. No weight should be supported by the bell. The maximum trench width as recommended by ASTM at the level of the top of the pipe shall be maintained as narrow as possible, taking into consideration the limitation of the excavation equipment except as may be permitted by the Town Engineer upon investigation of the soil conditions, laying methods and earth loadings.

All pipes and specials shall be carefully inspected before being laid, and no cracked, broken or defective pipe or special shall be used in the work. All pipe shall be carefully inserted in the bell in such a manner that there will be no unevenness of any kind along the bottom half of the pipes and so that there is a uniform joint space all around.

All pipe that is field cut shall have the homing-marks reestablished, insuring for proper seating depths. Pipes that are field cut shall have the cut ends retapered, by grinding or filing, as close to the original taper provided by the manufacturer as possible. When homing pipe with a spud-bar or other mechanical equipment, other than by hand, place a piece of wood between pipe and tool to prevent damage to bell end-section.

Pipe laid in open cut shall have all trench spaces and voids solidly and completely filled with suitable earth materials from the excavations which shall be thoroughly and solidly rammed into place, unless otherwise specified.

The ends of the pipes shall be protected to prevent the entrance of dirt or other foreign substances. Such protection shall be placed at night or whenever pipe laying is stopped for any reason. Suitable plugs designed for use with the pipe material shall be provided and properly secured and used to cap all slants and branches.

C. Flexible Conduit Installation

Plastic sewer pipe (PVC) and other flexible pipe shall be carefully installed in accordance with the above specification for Rigid Conduit Installation, except where the following paragraphs modify those specifications.

Flexible conduit for sewer pipe shall be installed in accordance with "Underground installation of Flexible Thermoplastic Sewer Pipe" ASTM Designation C 2321.

The Contractor shall take special precautions when homing PVC pipe not to over-seat past the home-marks. The pipe installation must include adequate bedding to hold its proper placement, prior to installing the next section.

The Contractor shall use caution when stringing thermoplastic pipe. Excessive spans, in sunlight, will cause bowing damage; and said damaged spans will be rejected.

In addition to the construction and testing procedures outlined in other sections of these specifications, the Contractor shall be required to install the flexible pipe in such a manner so that the diameter deflection of the pipe shall not exceed five percent (5%) when tested in accordance with the Final Acceptance Test. Bedding materials surrounding the pipe shall be compacted to the densities required to meet the five percent (5%) maximum deflection requirement. The area requiring compaction shall be included in the bed and side fill material and also the material placed above the pipe for a distance of twelve (12) inches over the top of the pipe.

The First Class Pipe Laying Method for Flexible conduit may be achieved by Class B Bedding Methods as shown in the ASCE Manual of Practice No. 37, latest edition. Under this class B Bedding Method, the pipe shall be bedded in compacted granular material (Class I or II) placed on a flat trench bottom. The bedding shall have a minimum thickness of one-fourth (1/4) the outside pipe diameter below the pipe and shall extend twelve (12) inches above the top of the pipe level and full width of the trench. All granular bedding material shall be placed in the trench in approximately six (6) inch layers.

Compaction shall be accomplished by hand or Mechanical Tamping or by "Walking" the granular material in for Class I materials only. When Class II materials are used compaction shall be accomplished by hand or mechanical

tamping only to a minimum eighty-five percent (85%) Standard Proctor Density. Backfill from a point twelve (12) inches above the top of the pipe to the trench surface shall be in accordance with "backfilling Methods A or B or C" depending on the trench location.

Plastic pipe shall not be blocked, except where the plans or specifications call for concrete encasement or concrete cradles for the pipe. Blocks shall be encased in concrete also, or removed. Where plastic pipe is to be installed below maximum ground water table, adequate weights shall be provided to prevent flotation of the pipe.

Pipe and fittings shall be carefully inspected before being installed. Cracked, broken or otherwise defective pipe, shall not be used.

8.05 Laying of PVC Force Mains

A. Installation of Buried PVC Pipe

In general, the installation of buried mains shall conform to the requirements of the manufacturer or the AWWA standard for the pipe being installed.

PVC pipe shall generally be installed to conform with Laying Condition F as defined by ANSI A 21.1 and conform with the backfilling and trench maintenance requirements as specified under these specifications.

Plastic pipe shall be firmly bedded in Class II or Class II materials and the bedding thoroughly compacted. Bedding shall be carefully formed by hand to provide complete support of full length of pipe barrel and shall extend to a point 12 inches above the top of pipe. Bell holed shall be formed as necessary. No gravel or stones larger than three sixteenths (3/16) inch shall be permitted within three (3) inches of outer surface of pressurized plastic pipe. Plastic pipe fittings shall be blocked as required. Unless specifically authorized by the Town, Class IV material shall not be allowed for bedding. Backfill above the bedding zone shall be as required.

Pipe and fittings shall be carefully inspected before being installed. Cracked, broken, bent or otherwise defective pipe shall not be used in work. Exposure to sunlight will be avoided where possible.

Jointing of PVC pipe shall be performed in the ditch, in accordance with recommendations of manufacturer.

Where metal harnesses for thrust protection are necessary, only cast iron fittings with slotted hydrant lugs, specially made for use with plastic pipe shall be used.

A continuous wire shall be taped to the top of any non-metallic force main to facilitate line location. Beginning at the lift station, the wire shall be accessible from the surface with a force main marking station (Figure 5-12C) at that point, and then every 500' along the force main. Carsonite flexible utility markers shall be installed at the force main marking stations and at each 45 degree bend or

larger. Any splicing of the wire underground shall be done in a watertight and insulated manner so that the wire doesn't ground. A continuity test shall be performed at the completion of construction to confirm proper installation.

In addition, marking tape shall also be installed between eighteen (18) inches minimum and twenty-four (24) inches maximum below finish grade and directly above the installed pipe line. It shall be laid in such a manner that it is not damaged by backfilling.

B. Fittings

All fittings of 22½ degree bends and greater, including tees shall be properly anchored by concrete thrust blocks of sufficient size not to exceed a soil pressure of two (2) tons per square foot. This blocking shall be installed prior to backfilling and testing.

8.06 Structure Installation

All manholes, inlets and catch basins shall be installed on a minimum of a 6" No. 8 stone base. This material shall be compacted.

Exterior joint collar installation shall be as follows:

The collar shall be designed so that when it is applied around the joint the ends shall overlap at least 6" and when the straps are secured a layer shall completely cover the strap protecting them from moisture and rust. After removing the protective paper, the band shall be placed around the manhole, mastic side to the pipe and spanning the joint. The steel straps shall be secured with the proper tools. The closing flap shall cover all remaining exposed strap.

Installation of preformed gasket material:

The installation of the preformed gasket material used in the installation of the adjustment rings and/or casting shall include the use of a compatible primer or solvent as recommended by manufacturer of butyl base material to prepare surfaces prior to application of butyl base material.

8.07 Pavement Installation

A. Subgrades

Subgrades for all pavements shall be compacted no less than 95 percent of their maximum density at optimum moisture based on the modified Proctor compaction test (modified AASHTO [1978], Designation T-180, and ASTM [1980], Designation D 1557).

B. Concrete Pavement

Concrete pavement and base course shall be constructed in close conformance with the Indiana Department of Transportation Standard Specification, Section 500, latest edition. Pavement shall be broom finished.

C. Bituminous Pavement

Bituminous pavement, including base course, shall be placed and compacted in accordance with the INDOT Standard Specification Sections 300, 400, and 600 as applicable.

D. Traffic Control

The Contractor shall plan construction activities to minimize impact to traffic. Local traffic access must be maintained at all times. The Contractor shall so schedule his work whenever possible and make suitable provisions for access by local residents, school buses, police, emergency, fire and mail delivery vehicles. The Contractor shall keep fire hydrants and other public utility valves accessible at all times. To maintain traffic movement, appropriate traffic control devices shall be used. Such traffic control devices shall comply with the latest edition of the Indiana Manual on Uniform Traffic Control Devices and Sections 104.04, 107, and 801 of the Standard Specifications.

SECTION 9

RESTORATION OF SURFACES

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SECTION 9

RESTORATION OF SURFACES

9.01 General

Restoration of surfaces within the public right-of-way and easements shall include the removal of the existing surface, the disposal of the surplus material and the construction of new surfaces and adjusting all new and existing structures for proper grade prior to paving as indicated on the plans and/or as specified in these Standards.

9.02 Restoration of Paved Surfaces

A. Restoration

After all excavations within the limits of paved surfaces have been properly backfilled and compacted, the paved surfaces shall be restored to a condition as good as or better than existed prior to the beginning of the work, in accordance with the following specifications.

Paved Surfaces: Streets, alleys, sidewalks, driveways, curbs and gutters, not constructed or maintained by the State Highway Department, but paved with asphalt, concrete, cinders, crushed stone, waterbound macadam, oil-bound macadam, or heterogenous paving materials, which are wholly or partially removed, damaged, or disturbed by the Contractor's operations, shall be restored with like or better materials, acceptable to the Town, to a condition as good as or better than existed prior to the beginning of the work, so that movement of traffic, both vehicular and pedestrian, through the restored way shall be as free, safe and unimpeded as before.

B. Temporary Surface

Temporary trench surfaces shall be installed and maintained in accordance with these specifications. This temporary surface shall be maintained by the Contractor until the permanent pavement is placed. Before placing permanent pavement, all or parts of the temporary surface shall be removed, as necessary, and hauled from the site of the work.

C. Temporary Pavement Replacement

Trench surfaces of highly traveled streets and roads may be, at the direction of the Town, required to receive a temporary pavement replacement of cold mixed bituminous pavement. This temporary pavement shall be surface mixture Class A or B prepared and placed in accordance with Section 406 Cold Mixed Bituminous Pavement of the latest edition of the Indiana Department of Transportation Standard Specifications. Prime and tack coats shall not be required. All temporary pavement shall be maintained by the Contractor to proper grade so as not to impede the safe flow of traffic until the permanent pavement replacement is made.

D. Permanent Paving

Permanent paved surfaces shall be restored in accordance with the following requirements, unless otherwise set forth by the Town Engineer, in all cases, the methods and materials of restoration shall meet the requirements of the Indiana Department of Transportation, as applicable.

1. Class "B" Concrete Pavement

Existing local streets, roads, alleys, driveways and parking areas consisting of concrete pavement shall be restored according to the following requirements.

Areas subjected to excavation or damage by the Contractor are to be replaced as a whole. Sidewalks to be replaced in complete sections, streets and driveways as complete sections or replaced with sections that coincide with the original pattern, and to the Town's satisfaction.

Prior to placing concrete, the existing edges are to be saw-cut in a neat straight manner, sub-base compacted, wetted down and edges swept clean. The use of flexible joint material is required as needed. All chunks of existing material larger than three by three (3 x 3) inches are to be removed.

Class "B" concrete pavement shall consist of a cast in place, layer of Class A concrete with one (1) layer of woven wire fabric (6 x 6 _ W1.4 x W1.4) meeting ASTM Designation 497. The concrete layer shall be six (6) inches thick. All rigid concrete pavement work and materials shall meet the latest specifications of the Indiana Department of Transportation.

2. Class "C" Asphalt Pavement

Existing local streets and roads consisting of asphalt paving shall be restored with binder and surface of the thickness specified and as follows:

Areas subject to Class C asphalt pavement replacement shall have the existing edges (those created by cutting prior to excavation) re-cut in a neat straight manner as to remove irregularities and damaged areas. Manholes, service line trenches and existing valve areas are to be boxed out in a neat manner. All cuts shall be parallel or perpendicular to the trench. Curved or diagonal cuts shall not be allowed. All chunks of existing material larger than three by three (3 x 3) inches are to be removed.

The aggregate base course, including the previously placed temporary surface or pavement, shall have the upper portions removed to allow placement of the binder and surface. After the base is cutback, it shall be re-compacted with a ten (10) ton roller or other suitable equipment if approved by the Town Engineer. Care shall be taken to assure that not less than six (6) inches of compacted aggregate base remains below the permanent pavement.

A tack coat shall be applied to the cleaned and patched surface at a rate of 0.05 to 0.10 gallons per square yard immediately prior to placing of bituminous mixtures.

The binder course(s) shall consist of compacted Hot Asphaltic Concrete, Type A, Size No. 9LV or 11LV as defined by the latest edition of the Indiana Department of Transportation Standard Specifications. Compaction shall be accomplished with suitable smooth wheel rollers. Generally, conventional self-propelled rollers of not less than 10 tons gross weight shall be used. The Town Engineer may allow other specialized rollers for narrow trenches or lighter rollers with vibratory action. The Town Engineer shall consider alternate equipment only if Contractor requests same in writing and includes technical data on the specific equipment to be considered.

The quantity and thickness of binder courses required shall match the existing pavement, but not less than one (1) course, three (3) inches in thickness.

When the existing pavement surface is granular material, or a new granular base is placed, the surface shall be fine graded and compacted by rolling to produce a smooth uniform surface free of voids and depressions. A prime coat, if specified, shall be applied to the graded and compacted granular surface at the rate of 0.30 to 0.50 gallons per square yard prior to the placing of bituminous mixtures or surface seal coats.

The surface course shall consist of compacted Hot Asphaltic Concrete Surface Type A (Size No. 11LV or 12LV), as defined by the latest edition of the Indiana Department of Transportation Specifications and placed in the same manner as described above for binder. The surface thickness shall match the existing pavement, but not less than one (1) inch.

3. Adjustments of Shoulders Necessitated by Resurfacing

The shoulders of the road shall be adjusted to the elevation of the resurfacing with all materials (i.e., earth, sod, gravel, crushed stone, asphalt, etc.) necessary. The transition may be made within a distance of one (1) foot to one and one-half (1 & ½) feet from the edge of paving except in unusual cases where a greater distance is required. Existing

driveways shall be primed and wedged from a featheredge to the final height of the resurfaced street paving.

9.03 Restoration of Ground Surfaces

All ground surfaces in public Rights of Way and easements that have been damaged or destroyed by the Contractor's operations shall be restored in accordance with the following specifications. All surplus material, rock, trees, shrubs, concrete pipe, asphalt, crushed stone, etc., not to be used in the Contractor's restoration operations shall be removed from the site and disposed of in an acceptable manner.

A. Restoration of Grassed Areas with Sod

Where shown or required by the Town, established grassed areas shall be restored with sod containing grasses of comparable quality. Sod shall be placed and rolled so that the final elevations of the area being restored are the same as existed prior to the beginning of construction. Sod shall be pegged where necessary, and shall be watered and cared for to assure its survival.

B. Restoration of Grassed Areas with Seed and Mulch

The Contractor shall seed and mulch in one of the following manners:

1. The ground shall be loosened approximately three (3) inches deep with a disc or a harrow and fertilized with twenty-five (25) pounds of 10_10_10, or equivalent, and one hundred (100) pounds of agricultural lime per one thousand (1,000) square feet.

The mixture of seed applied shall be as follows:

35% Kentucky Bluegrass
30% Perennial Rye Grass (Lolium Perenne)
30% Kentucky 31 Fescue
5% Inert Matter

The seed shall be applied at a rate of four (4) pounds per one thousand (1,000) square feet and shall be well raked or boarded into the soil and mulched with straw of sufficient thickness to hold the seed until it has germinated.

2. Mulching Material: Materials for mulching shall be wheat, oats, barley or rye straw only. All materials shall be reasonably free from weed seeds, foreign material, and other grasses and chaff, and shall contain no Johnson Grass. The straw shall be reasonably bright in color and shall not be musty, moldy, caked, or of otherwise low quality. The straw shall be dry on delivery, and spread evenly.

Mulch net may be required on special areas designated by the Town to hold mulch in place until turf is established. The net shall be made of a tightly twisted craft paper yarn, leno woven with a wrap count of one (1) pair of yarns per two (2) inches and a filling count of two (2) per inch. Salvage edges and center shall be reinforced with polyethylene filament. The material shall have a minimum width of forty-five (45) inches.

SECTION 10

EROSION CONTROL

SECTION 10 EROSION CONTROL

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SECTION 10

EROSION CONTROL

10.01 General

This section provides the general guidelines for the control of erosion and sediment for construction sites. Control of sedimentation for construction site may be accomplished through utilization of a variety of control practices. The complexity of the erosion and sediment control plan will vary depending upon individual site conditions. The goal of such a plan is to limit the quantity of sediment leaving the construction site. The Contractor's plan must be approved by the Town.

In addition, the Contractor must also comply with Rule 5 327 IAC 15-5 for land alteration which disturbs 5 acres or more.

10.02 Permitting Requirements

If the Owner/Contractor is required to submit a soil erosion control plan to the State under Rule 5 (327 IAC 15-5), such plan shall be deemed in compliance with Town requirements. In this case all applicable State and Federal permits or notices for land disturbing activities shall be obtained or filed prior to beginning land disturbing activities. Copies of all applications, letter of intent, submittals, plans and other erosion and sediment control related information shall be submitted to the Town.

10.03 Design Guidelines

In order to fully achieve an acceptable level of erosion and sediment control on the construction site, the following design principles shall be fully adhered to during site analysis and development of the erosion and sediment control plan:

- A. Existing site contours should be followed as close as reasonably possible in order to minimize cut and fill.
- B. Existing natural vegetation should remain undisturbed for as long as possible during the construction activities. Naturally vegetated areas along property lines, jurisdictional wetlands, lakes, and watercourses, both natural and man-made, should be left undisturbed during all phases of the site construction. These vegetative filter strips will be required at the discretion of the Town.
- C. A logical sequencing of site construction activities must be provided in order to minimize the size of exposed land areas, and the length of time land areas are left without some form of temporary or permanent soil protection.
- D. Soil stockpiles shall be stabilized utilizing either vegetative establishment, sediment trapping barriers, or erosion control measures such as tarping or mulching, singly or in combination.
- E. Storm sewer inlets which are made operable either before or during the

construction phase of development shall be provided with protection from siltation.

- F. Stable, properly maintained construction traffic access routes and stream crossings shall be identified on the site erosion and sediment control plan as needed. These construction access routes shall be installed as part of the site perimeter sediment control barriers, prior to the initiation of on-site land alteration activities. Where sediment is transported onto public street or road surfaces, these streets or roads shall be cleaned thoroughly at the end of each day. Sediment shall be removed by either scraping, shoveling or sweeping and be transported to a controlled fill area. Street washing will be allowed only if wash water flows to a controlled sediment trapping area.
- G. Runoff velocities shall be kept as low as possible.
- H. A thorough maintenance and follow-up program, and identification of the person(s) responsible for its implementation will be required.

The latest edition of the Indiana Handbook for Erosion Control in Developing Areas (HECDA) shall be used for detailed technical guidance for all erosion and sediment control practices. The following general practice guidance applies to the development of all control plans:

- A. Perimeter Control - Perimeter control measures shall be installed as specified on the approved plan, including: construction access drives, straw bale dams and fabric fencing, temporary sediment traps, sediment basins, and diversions.
- B. Vegetative Control - Disturbed areas which are at finish grade shall be permanent seeded within seven (7) days. At the discretion of the Town; barren areas to be rough graded and left undisturbed for more than thirty (30) days shall be established with temporary vegetation; and dormant seeding will be required during seasonal periods (October through February) for those barren areas to be left undisturbed for one hundred and twenty (120) days or longer.
- C. Slope Protection - Slope protection shall be provided by use of temporary and permanent diversion levees, vegetative cover, and slope drains. Concentrated stormwater flows shall not be allowed to flow down cut or fill slopes without proper slope stabilization.
- D. Sediment Trapping - To achieve the goal of preventing sediment from leaving the construction site, the Town will require the use of sediment barriers such as fabric fencing, straw bale dams, and sediment basins.
- E. Protection of Outlet Channel - Concentrated stormwater runoff leaving a development site shall be outletted to an open channel, storm sewer pipe or culvert which is capable of receiving this discharge. Runoff velocities shall be controlled during all storm events so that the peak runoff velocity during and after the completion of the land alteration approximates existing conditions.

The principles and practices provided by the State in Rule 5 are to be followed in the development of all control plans. Rule 5 does not give specific requirements for use of various practices leaving that to the localities. Individual practices can be modified or waived upon request to the Town based on special site characteristics and conditions. The designer should rely on the Indiana Handbook for Erosion Control in Developing Areas (HECDA) for detailed design, construction and maintenance criteria for all erosion control practices. Such criteria shall be required by the Town unless waived in writing. The manual can be obtained from:

Urban Conservation Program
Division of Soil Conservation
Indiana Department of Natural Resources
402 West Washington Street, Rm. W-265
Indianapolis, Indiana 46204-2748

SECTION 11

INSPECTION, TESTING AND ACCEPTANCE

SECTION 11 INSPECTION, TESTING AND ACCEPTANCE

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SECTION 11

INSPECTION, TESTING AND ACCEPTANCE

11.01 General

This section describes the minimum requirement and general procedures for the inspection, testing and acceptance of systems dedicated to the Town of Newburgh.

11.02 Inspection

Inspection of the construction shall occur for the duration of the project, including the installation of service connections.

A. General Requirements

1. Contractor and/or Owner shall provide notice to the Town and his representative of the planned commencement of construction thirty (30) days prior to such commencement.
2. Once the construction starts, the Contractor shall be responsible for informing and/or notifying the inspection representative assigned of the following. (NOTE: The Town may require as much as five (5) working days to provide inspection services during construction.):
 - a. Daily work schedule, including any changes in schedule;
 - b. Prior notification if work is to be performed on weekends and/or holidays;
 - c. Date tests are to be performed; and
 - d. Date as-built verification is to be performed.
3. The Town, upon request of the Contractor and/or Owner, will schedule the Final Inspection.

All testing required shall be paid for by the Contractor and performed under the observation of the Town or Town's representative. It shall be the Contractor's responsibility to schedule the testing with the Town representative and/or Town. Test results obtained in the absence of the presence of the Town will not be accepted.

11.03 Sewer System Testing

A. Leakage Testing

1. General

All sanitary sewers shall be tested for infiltration and exfiltration.

Contractor shall furnish all labor, materials and equipment required for making tests. Tests shall be made at times arranged with the Town and

his representative. Sections of sewers shall be isolated and measurements of infiltration and exfiltration shall be made by approved means. The Town or his representative must be present during all final tests.

Sewers whose crowns are below ground water level at time of testing shall be tested for infiltration. Where crown of pipe is above ground water level, sewer shall be tested for exfiltration. If ground water level varies during period of construction, sewers may be tested for both. Spans are not to be tested for Final Acceptance until complete.

Immediately preceding all leakage tests (exfiltration, infiltration and air) the sewer to be tested shall be cleaned by flushing a ball through the pipe. The Contractor shall furnish an inflatable rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be used without a tag line; or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in the last cleanout or manhole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris, or a damaged pipe shall stop the ball, the Contractor shall remove the obstruction.

2. Infiltration Tests

Sanitary sewers which are constructed with ground water level above crown of pipe shall be tested for infiltration after sewers have been installed and backfilling has been substantially completed. A convenient section of sewer shall be selected between manholes. The upper section of sewer shall be plugged watertight with temporary bulkhead. A suitable measuring device shall be installed at the lower end.

The amount of water flowing through the outlet shall be measured periodically through the next twenty-four (24) hours. The flow thus measured shall then be converted by gallons per day per inch diameter per mile and compared with the maximum allowable limit of two hundred (200) gpd/in./mile.

3. Exfiltration Tests

A section or sections of sanitary sewer between manholes shall be isolated by watertight bulkheading. Isolated sections shall then be filled with water to a level three (3) feet above the crown of the pipe at the upstream end of the section; water level at the downstream end of the section shall not be more than six (6) feet above the crown of the pipe. After allowing the system to stabilize overnight, the section shall be refilled with water to the original level. After one (1) hour more, the volume of water lost in the section shall be determined by measuring the drop in the water level.

4. Allowable Leakage

Infiltration or exfiltration of any given segment of sewer pipe shall not be permitted to exceed a rate of two hundred (200) gallons per twenty-four (24) hours per mile of sewer per inch of pipe diameter (0.158 gph/in./100 ft.).

5. Low Pressure Air Testing

For gravity sanitary sewers installed with the pipe crown above the ground water level, air pressure testing may be used in lieu of the exfiltration test. Low pressure air testing is used to determine the existence of pipe leaks; however, it does not indicate water leakage limits.

Prior to the low pressure air testing, all wyes, tees, or end of side sewer stubs shall be plugged with flexible-joint caps, or acceptable alternate, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible-jointed lateral connection or extension.

All plugs shall be securely braced to prevent possible blowout due to internal air pressure. One plug shall have an inlet tap, or other provision for connecting a hose to a portable air supply source. Air hose shall be connected to the inlet tap and a portable air supply source.

Air equipment shall consist of all necessary valves and pressure gages to control rate of air flow into the test section and to enable monitoring of air pressure within the test section. Testing apparatus shall also be equipped with pressure relief device to prevent the possibility of loading test section with full capacity of compressor.

Air shall be slowly added to test section until pressure inside pipe is raised to 4.0 psig. After a pressure of 4.0 psig is obtained, air supply shall be regulated such that pressure is maintained between 3.5 and 4.0 psig for a period of two (2) minutes, to allow air temperature to stabilize in equilibrium with temperature of pipe walls. Pressure will normally drop slightly until equilibrium is obtained. During this period, all plugs shall be checked with soap solution to detect any plug leak.

After this two (2) minute air stabilization period, air supply shall be disconnected and test pressure allowed to decrease. Time required for test pressure to drop from 3.5 psig to 2.5 psig is determined by means of stop watch, and this time interval is then compared with required time to determine if rate of air loss is within the allowable limit. Required time to arrive at the allowable air loss is calculated by means of following formula:

$$T = \frac{0.0850 DK}{Q}$$

Where: T = time in seconds
 K = .000419 DL but not less than 1.0
 Q = Rate of loss (=0.003 cfm/sq. ft. of internal surface)
 D = Diameter of pipe in inches
 L = length of pipe tested in feet

Upon completion of test, the bleeder valve shall be opened and all air allowed to escape. Plugs shall not be removed until all air pressure in test section has been released. Also, no one shall be allowed in trench or manhole while test is being conducted.

All pipe lines thirty (30) inch diameter and over shall be tested one joint at a time with joint testing apparatus. Joint shall be isolated with an expanding shield equipped with gaskets which fit tightly against pipe walls on each side of joint to be tested. Allowable leakage for such a test is equal to that which would occur on the basis of allowable leakage for one length of pipe.

If measured time interval for the pressure to drop from 3.5 psig to 2.5 psig is less than the required time as calculated, sewer section shall be deemed to have failed test. Contractor shall then proceed to repair pipe at his cost as necessary until the sewer section passes the test. All testing shall be conducted in presence of the Town's representative (inspector).

6. Excessive Leakage

If infiltration or exfiltration rate of sewer exceeds maximum rate specified, contractor shall make all necessary repairs to reduce leakage below the allowable. Such repairs shall be made at Contractor's expense. Under no circumstances will grouting be considered an acceptable means of repair. When repairs have been completed, but not more than thirty (30) days after first test, sewer section shall be subjected to a second leakage test as specified above.

If the second test should again indicate leakage in excess of the allowable amount, the Contractor shall, at his own expense, provide complete internal inspection of entire section in question, by means of videotape recording of television inspection or by color photography with exposures every two (2) to four (4) feet along the sewer. Contractor shall employ an independent sewer testing service to inspect pipe. Inspection service shall prepare a written report and shall review videotape or films with the Town, Contractor, and Town's representative. Contractor shall then submit a written plan for correction of leakage. Contractor, Town, and Town's representative shall meet as necessary to develop actual program for inspection and repair. Contractor shall not proceed to repair line until he receives written authorization to proceed from Town or Town's representative. All inspections, reports, repair, replacement, and

compensation for additional professional expense shall be paid by the Owner/Contractor.

B. Deflection Testing and Inspection of Installed Flexible Plastic Pipe

1. Final Acceptance Test

a. Lamping

Prior to the final deflection test, the Town or his representative may, at his option, order the lamping of certain or all sections. Lamping must show a "full moon" and no excessive puddling effects in the span. If excessive water is present in the line, the Town may require a television inspection for the section of line found deficient.

b. Television Inspection

The Contractor shall produce a video tape using a pan-and-tilt, radial viewing, pipe inspection camera that pans 275° and rotates 360°. The television camera used for the inspection shall be specifically designed and constructed for such inspection. The camera shall be operative in 100% humidity conditions. The Contractor shall use a camera with an accurate footage counter that displays on the monitor the exact distance of the camera from the centerline of the starting manhole. The Contractor shall use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. A reflector in front of the camera may be required to enhance lighting in dark or large diameter pipe. The video camera shall be capable of showing on the tape the City name, Project name, Contractor name, date, line size and material, line identification (Town's manhole numbers at both ends) and ongoing footage counter. The camera, television monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of the Owner; and if unsatisfactory, equipment shall be removed and replaced with adequate equipment. The expense for unsatisfactory inspections will be incurred by the contractor.

Extra High Grade T-120 VHS video tapes shall be supplied for all television surveys. All taping shall be performed at SP (Standard Play, 2 hrs/tape). All video tapes shall be submitted to the Owner and will become the property of the Owner. The tape shall be turned over to the Town after taping is complete. The contractor may retain a copy for his files. Additional copies of the tape will be at the contractor's expense.

The Town, or its representative, shall be notified 48 hours prior to taping.

Two video tape labels are required. One label shall be placed on the spine of the video tape and the other on the face of the video tape. Permanently label each tape with the following information:

The Contractor shall produce a video tape using a pan-and-tilt, radial

viewing, pipe inspection camera that pans 275° and rotates 360°. The television camera used for the inspection shall be specifically designed and constructed for such inspection. The camera shall be operative in 100% humidity conditions. The Contractor shall use a camera with an accurate footage counter that displays on the monitor the exact distance of the camera from the centerline of the starting manhole. The Contractor shall use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. A reflector in front of the camera may be required to enhance lighting in dark or large diameter pipe. The video camera shall be capable of showing on the tape the City name, Project name, Contractor name, date, line size and material, line identification (Town's manhole numbers at both ends) and ongoing footage counter. The camera, television monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of the Owner; and if unsatisfactory, equipment shall be removed and replaced with adequate equipment. The expense for unsatisfactory inspections will be incurred by the contractor. Extra High Grade T-120 VHS video tapes shall be supplied for all television surveys. All taping shall be performed at SP (Standard Play, 2 hrs/tape). All video tapes shall be submitted to the Owner and will become the property of the Owner. The tape shall be turned over to the Town after taping is complete. The contractor may retain a copy for his files. Additional copies of the tape will be at the contractor's expense.

The Town, or its representative, shall be notified 48 hours prior to taping.

Two video tape labels are required. One label shall be placed on the spine of the video tape and the other on the face of the video tape. Permanently label each tape with the following information:

Spine of Tape

City Name:		Contractor's Name:		Project Name:	
Inspection Type:			<input type="checkbox"/> Survey	<input type="checkbox"/> Pre-Installation	<input type="checkbox"/> Post-Installation
Tape No:		Date Televised:		Date Submitted:	
Basin No:					

Face of Tape

Manhole No. From	Manhole No. To	Pipe Diameter	Pipe Length	Street

c. Deflection Mandrel Test

The main line shall be flushed prior to the vertical ring deflection tests. The vertical ring deflection tests shall not be performed prior to successful completion of leakage testing requirements.

All main line plastic pipe sewers eight (8) inch in diameter and greater shall be measured for vertical ring deflection at least thirty (30) days after installation, but no later than thirty (30) days prior to final acceptance of the project. Maximum ring deflection of the pipeline under load shall be limited to five percent (5%) of the vertical internal pipe diameter. All pipe exceeding this deflection shall be considered to have reached the limit of this serviceability and shall be relaid or replaced by the Owner/Contractor.

The cost of all deflection testing shall be borne by the Contractor and shall be accomplished by using a deflectometer, which will

produce a continuous record of pipe deflection, or by pulling a mandrel, sphere, or pin-type go/no-go device through the pipeline. The diameter of the go/no-go device shall be ninety-five percent (95%) of the undeflected inside diameter of the flexible pipe. The mandrell shall be pulled through the sewers by one man, by hand and specifically without the aid of mechanical devices.

C. Sanitary Manhole Testing

All manhole vacuum tests shall be conducted in the presence of a representative of the Town.

The vacuum test equipment shall consist of: inflatable plugs for all incoming and outgoing sewer lines; an inflatable test collar to seal the manhole at the manhole frame; and a vacuum pump. A vacuum gauge shall be located in-line between the test collar and the pump to accurately indicate the vacuum in inches of mercury within the manhole. The vacuum gauge shall have a range to no more than thirty (30) inches of mercury, with scale markings of no greater than one-half ($\frac{1}{2}$) inch of mercury vacuum and an accuracy to within \pm two percent (2%) of true vacuum.

The vacuum test shall be conducted by plugging all incoming and outgoing sewer lines in the manhole at a location beyond the connection of the sewer pipe with the manhole. All plugs shall be blocked in place so as not to move during the test. The vacuum testing collar shall be inflated in the frame in accordance with the equipment manufacturer's recommendations. A vacuum of ten (10) inches of mercury shall be drawn and the vacuum pump turned off and the valve between the vacuum pump and the vacuum gauge shall be turned off.

The time period which is taken for the vacuum to fall from ten inches (10") of mercury to nine inches (9") of mercury shall be determined. If the time taken for the vacuum to reduce the ten inches (10") of mercury to nine inches (9") of mercury is less than the time indicated in the following Table, then the manhole work shall be considered not acceptable and shall be rejected. If the time is equal to or exceeds the time indicated below, the manhole work shall be accepted. This Table is from ASTM C 1244-93 which is "Standard Test method for Concrete Sewer Manholes by the Negative Air Pressure Test".

Minimum Test Times for Various Manhole Diameters

Depth (ft.)	Diameter =					Time (sec)			
	30"	33"	36"	42"	48"	54"	60"	69"	72"
8	11	12	14	17	20	23	26	28	33
10	12	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	23	30	35	41	46	51	57
16	22	24	30	34	40	46	52	58	65
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	59	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	35	42	51	59	69	78	87	97
26	36	39	45	55	64	75	85	94	105
28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	109	121

Contractor shall submit to the Town the results of each manhole vacuum test. Such reports shall include a description of the location of the manhole, the time, date and weather of the test, a list of all persons present, the diameter and depth of the manhole and the allowable test results, and the actual test results.

All manholes shall be repaired by Contractor and retested as described above until a successful test is made. After each test, the temporary plugs shall be removed.

Once all manholes have been tested, the manholes will be given a field visual inspection. The inspection shall be performed at the discretion of the Town during the warranty period following a rainfall sufficient enough to raise the groundwater table above the problem areas. All leakage problems determined by this inspection shall be corrected by the Contractor within an agreed upon time to the satisfaction of the Town. Where necessary to complete the work, the Contractor shall be responsible for the bypassing and/or blocking of the flow in the manholes and must have prior approval by the Town. It will be the Contractor's responsibility to supply his own traffic control as required by the particular location and/or jurisdiction.

D. Force Main Testing

1. General

After the pipe has been laid and partially backfilled, all newly laid pipe or any valved sections of it shall be subjected to a hydrostatic pressure tests. The duration of each pressure test shall be for a period of not less than two hours and not more than six hours. The basic provisions of AWWA C-600, Section 4 shall be followed for all pressure testing.

The test pressure shall not exceed pipe and/or thrust resistant design pressures. The test pressure shall not vary by more than plus or minus 5 psi for the duration of the test.

All newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing or 50 psig whichever is greater.

2. Pressurization

Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Town. The pump pipe connection and all necessary apparatus, including gauges and meters shall be furnished by the Contractor. Before applying the specified test pressure, air shall be expelled completely from the test section.

Any exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or joints that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the Town or his representative.

3. Leakage Test

After the completion of the pressure test a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi of the specified test pressure after the pipe has been filled with water and the air has been expelled.

Leakage shall be measured by a drop in pressure in a test section over a period of time.

For sanitary pressure lines, no leakage shall be permitted during the 2 hour test period.

E. Lift Station Pump Testing

Lift station pump test will be performed by the Town or his representative during the lift station's final inspection. The Contractor shall be responsible for providing the clean water to run the pumps and perform the test(s).

1. Manufacturer's Start-Up

Prior to the Town's final inspection of the lift station equipment, the Contractor shall be responsible for coordinating start-up activities with the pump manufacturer's representative in accordance with the manufacturer's requirements. The Town or his representative must be present at the time of manufacturer's start-up.

Any deficiencies in equipment and/or workmanship noted during the manufacturer's start-up shall be remedied by the Contractor prior to final inspection.

Upon successful completion of the manufacturer's start-up, the manufacturer shall deliver to the Contractor:

- a. Three (3) copies of a letter certifying that all pumping and electrical equipment has been installed and is operating in accordance with manufacturer's requirements;
- b. Two (2) sets of Operation and Maintenance Manuals; and
- c. One (1) complete set of Spare Parts as specified.

2. Final Inspection

The Contractor shall provide the following pump test equipment and materials:

- a. Water to conduct test;
- b. Amp/volt meter;
- c. Stop watch;
- d. Calibrated test gauge to measure operating head. The gauge shall be calibrated in feet of water from 0 to 100 feet in one foot increments; and
- e. Manufacturer's pump performance curves.

The Town's representatives attending the final inspection shall re-check any deficiencies. The Town's representatives shall then complete a cursory final inspection checklist and perform pump down tests which shall include the following:

- a. Manual check of all level ON-OFF operation, alarm and run lights;
- b. Determination of inflow rate (if any);
- c. Determination of pump capacity for each pump individually and both/all pumps simultaneously;
- d. Determination of pump capacity with force main full. Verification of full force main shall be determined by pressure gauge provided by Contractor. Force main shall be considered full when the line pressure stabilizes; and
- e. Plot performance of each pump or pump curves provided by Contractor.

Contractor shall provide all water necessary to conduct the pumping tests, and shall provide a connection for the test gauge on the blind flanged tee in the valve vault. The stem connection shall be equipped with a plug valve to close the connection after testing is complete. The connection shall be left in place and shall be suitable for use as an air bleed off.

The pumping test results must meet or exceed the design pumping criteria approved by the Town to successfully pass the final inspection. Any deficiencies noted during the final inspection shall be repaired/replaced by the Contractor to the satisfaction of the Town and reinspected/retested prior to final acceptance.

11.04 Testing of Pavement Materials

A. Subgrade Testing

The Contractor shall be responsible for providing soil Proctor analyses for all soils to be tested on the project. All test results shall be reviewed and a recommendation given by a qualified and licensed geotechnical engineer or geologist. At least one copy of each geotechnical report shall be submitted to the Town. The AASHTO Method T-99 (Standard Proctor Analysis) is to be the preferred test used.

Should subgrades not meet minimum compaction requirements (minimum 95%), other forms of soil modification shall be employed. This shall include but not be limited to scarifying and aerating, undercutting and aeration, total replacement of soils, or the installation of geotextiles such as woven or non-woven filter fabrics or geogrid soil reinforcing systems. A qualified and licensed geotechnical engineer or geologist shall be provided by the Contractor to give such recommendations.

B. Pavement Materials Testing

The Contractor shall furnish evidence to the Town as necessary to show that the materials to be furnished for a project conform to the requirements specified.

In addition, the Town may have any of the materials tested at any time to show compliance with the specifications. In connection with this

requirement, the Contractor shall provide such facilities as the Town may require for collecting and forwarding samples and shall hold the materials represented by the samples until tests have been made and such materials found to have qualities required by the specifications. All samples required shall be furnished and tested by the Contractor utilizing the services of a qualified and licensed geotechnical engineer or geologist without charge to the Town of Newburgh.

The frequency of sampling and testing shall be based on the number of tests required for each quantity of materials placed for a particular item of work as specified by the Town. Where no criteria for sampling and testing is given for a particular item or items of work by the Town, the Contractor shall adhere with the schedules and instructions specified in the Indiana Department of Transportation, Division of Materials and Tests Manual For Frequency of Sampling and Testing and Basis for Use of Materials, latest edition.

11.05 Documentation, Dedication and Acceptance Procedures

A. Documentation Requirements

In order for the Town Council to accept dedicated facilities, the following items shall be completed and on file:

1. Copies of all testing reports and data;
2. Copies of all O&M Manuals and lift station(s) (if applicable);
3. Pump manufacturer's certification letter (if applicable);
4. Lift station final inspection checklist (if applicable);
5. Final payment for inspection services;
6. As-built drawings;
7. Performance and/or maintenance bonds (if required);
8. Daily inspection reports;
9. Legal description of the land to be dedicated to the Town;
10. Copy of final recorded easements executed by the property owner(s), if easements are required; and
11. A written statement of facilities present on those lands. The written statement shall include:
 - a. Identification of the type and nature of facilities present
 - b. Dimensions of the facilities present
 - c. Statement of actual cost of construction, breaking out the cost of easements and cost of facilities.

B. Dedication

The Town Engineer shall review the above mentioned requirements and prepare a document stating that the work has been completed, the requirements have been met, and all items are in proper form. The Town Engineer shall include in the statement a recommendation on acceptance/denial of the facilities and may also include comments

regarding the project. The Town Engineer shall present to the Town Council its findings in a public meeting for their consideration.

C. Acceptance of Facilities

The Town will assume responsibility of the sanitary sewer when construction is fully completed in accordance with the plans and specifications and when all requirements in these standards are met.

The Town Council shall receive the recommendation from the Town Engineer, and upon review by the Town Attorney, Wastewater Superintendent, and Town Manager, shall make a determination as to acceptance of the facilities. A majority approval of the Council members present at the meeting is required for acceptance. The Town Council shall accept dedicated facilities by resolution.

Sewer taps will not be issued until the sewer main at the tap location is substantially complete, including all testing.

Proposed sanitary sewer construction shall be bonded by the owner at 100% of the projected cost to construct the proposed system. The Town's engineers must approve the cost estimate. "Bond" shall mean corporate surety bond, approved letter of credit or such other instrument as is acceptable to the Town. Upon acceptance of the sewer system by the Town, the owner shall bond the one year post acceptance period at 10% of the original cost to construct the system. The owner is responsible to assure that its bond instrument is current and shall request extensions of time before the instrument expiration date. Bonds shall be called before their date of expiration.

SECTION 12

CONSTRUCTION OF SANITARY SEWER SERVICE LATERALS

SECTION 12

CONSTRUCTION OF SANITARY SEWER SERVICE LATERALS

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SECTION 12

CONSTRUCTION OF SANITARY SEWER SERVICE LATERALS

12A RULES AND REQUIREMENTS

12A.01 General

This Section provides the general rules and policies for the construction of sanitary sewer service laterals. The ordinances for sanitary sewer systems governing these Standards are available for inspection at the Town Hall.

The following paragraphs provide a highlight of the provisions contained in the applicable Town Ordinances.

A. Prohibition Against Clean Water Discharges

No person shall discharge or cause to be discharged to any sanitary sewers either directly or indirectly:

- Storm Water
- Surface Water
- Ground Water
- Roof Runoff
- Subsurface Drainage (gravity or pumped)
- Uncontaminated Cooling Water
- Unpolluted Water
- Unpolluted Industrial Process Water

B. Mandatory Inspection of Building Connections (Service Laterals)

It shall be the responsibility of the Owner to notify the Town that the sewer work is available for inspection. The Town will conduct inspections on connections after not less than 24 hours notice has been given, from 7:00 AM to 3:00 PM Monday through Friday except on observed Town holidays. The building sewer shall be fully exposed from the foundation to the point of connection with the public sewer.

The Town may take a minimum of two (2) construction "as-built" photos for Town record prior to backfilling.

The Town and its authorized representative shall have the right of entry upon or through any premises for purpose of inspection of sewer work and any other construction activity performed on or associated with the connection of the building sewer to the Town sewer, including inspection for clear water discharges into the sewer.

C. Building Sewer (Service Lateral) Responsibility

It shall be the responsibility of the property owner(s) whose property is benefited to provide for, install and make private connections for the use of their premises to an existing public or building sewer. Further, it shall be the responsibility of the owner to make all necessary repairs, extensions, relocations, changes or replacements thereof, and of any accessories thereto. These requirements may be altered, modified or waived at the discretion of the Town when it is shown that compliance is not possible due to extenuating circumstances. Newburgh Sewer Department is responsible for repairs within Newburgh Sewer Department easements or right-of-way.

12A.02 Safety

Neither the Town nor its Engineer are responsible for safety on the job site. All codes, statutes and regulations relating to safety on the job site shall be followed by the Owner, Developer and Contractor. Direction by the Engineer, and inspections by the Engineer, are not designed to assure safety on the job, only that the sewer is built according to these standards and the drawings. The Contractor constructing the sewer shall advise each of its employees that the Town and the Engineer are not responsible for safety on the site.

A. Confined Space Access

For projects which include construction activities within "confined spaces" as defined by Title 29 CFR Part 1926.21(b)(6), the Contractor is hereby advised that he must fully comply with all pertinent requirements as delineated in this regulation and as interpreted by OSHA. The Contractor shall have and maintain all necessary safety and testing equipment at all times during the course of the construction activity.

B. Hazard Communication Standard

Pursuant to the Code of Federal Regulations, 29 CFR Part 1926, as may be amended, all Contractors, Subcontractors and materials suppliers on this Project shall provide access to all persons on the job site at all times, the Material Safety Data Sheets (MSDS) for all hazards of all chemicals per the Federal Regulations.

In addition, Contractors, Subcontractors and material suppliers shall provide training to their employees on the MSDS pursuant to the Federal Regulations.

C. Excavation Safety Requirements

It shall be the duty and responsibility of the Contractor and all of its Subcontractors to be familiar and comply with all requirements of Public Law 91-596 29 U.S.C., Sections 651 et. seq., the Occupational Safety and Health Act of 1970 (OSHA) and all amendments thereto and to enforce and comply with all of the provisions of the Act. In addition and as required by Indiana State Law, HB 2071, Section 14. of IC 4-13.6-5-12, the Contractor and all of its Subcontractors

shall comply with Subpart P of 29 CFR 1926 dated October 31, 1989 as may be amended.

12B GENERAL DESIGN STANDARDS

12B.01 General

The Town Council shall issue final approval for the installation of all public works facilities. All facilities shall be designed and installed in accordance with these Standards as well as applicable State and Federal regulations.

12B.02 Sanitary Sewer Service Lateral Design Criteria

A. General Standards

All sanitary sewer service laterals shall be designed and constructed in accordance with IDEM and Ten States Standards for Sewage Works Improvements.

Building sewers (service laterals) shall conform to the latest edition of the Uniform Plumbing Code, these Standards, and Town Ordinances. No more than one (1) building will be permitted to connect to a service lateral. Sewers with more than one (1) connection must be constructed as a sanitary sewer main in a dedicated easement.

The sanitary sewer service lateral shall connect to the public sewer at a mainline fitting. If a mainline fitting is not provided, a service connection may be made by cutting into the sewer and installing a manufactured fitting using a solid sleeve coupling. If approved by Superintendent, a service connection may also be made using a saddle connection. No sewer laterals shall be connected to a sanitary sewer trunk line.

Connections to sanitary manholes shall not be made without the prior approval of the Town. Service laterals shall connect to the manhole, when approved, at the manhole invert. Under these circumstances, the manhole base shall be pre-formed with a gasketed connection for the lateral line. The invert shall also be formed at the flow line to accept the lateral sewer connection. No inside drop connections shall be allowed without the prior approval of the Town.

Service laterals constructed when the sewer main is installed shall be terminated at the right-of-way line, lot line or easement line. Cleanouts shall not be installed until the lateral service connection is made to the structure being serviced.

The service laterals shall have a cleanout located approximately three (3) feet from the buildings exterior wall at the start of the sewer and extend to grade. This cleanout will be considered the connection point to the building's plumbing. The cleanout shall be fitted with a pop-off lid and shall be constructed such that it is located below the floor level serviced by the gravity sewer to serve as a relief

point in the event the municipal sanitary sewer backs up. The pop-off lid may be a loose fitting lid. It is the recommendation of the Newburgh Sewer Department that additional cleanouts should be installed along the lateral at intervals of 100 feet or less. These cleanouts should be installed with a water-tight detachable lid instead of the pop-off lid. Cleanouts installed under concrete or asphalt paving shall be made accessible by yard boxes or extended to grade and protected with approved methods and materials. See Figure 5-8A Lamphole Frame.

Building sewers (service laterals) installed for future connections shall be terminated at the right-of-way or easement and plugged to ensure 100 percent water tightness. A two (2) inch diameter PVC pipe that extends 4 feet above grade shall be installed to mark the end of the line. Additionally, a one-half ($\frac{1}{2}$) inch metal locator rod or a magnetic locator tape shall be installed at the end of the plugged line to within three (3) feet of the finished grade.

Industrial building sewers shall have a suitable control manhole for observation, sampling, and measurement of the waste stream, as required by the Superintendent.

B. Water Main Protection

1. **Horizontal and Vertical Separation:** Service laterals shall be laid at least 10 feet (3 m) horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot (3 m) separation, the appropriate reviewing agency may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the service lateral closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the lateral and at an elevation so the bottom of the water main is at least 18 inches (460 mm) above the top of the service lateral.

If it is impossible to obtain proper horizontal and vertical separation as described above, both the water main and service lateral must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards of the agency and be pressure tested to 150 psi (1034 kPa) to assure watertightness before backfilling.

2. **Crossings:** Service laterals crossing water mains shall be laid to provide a minimum vertical distance of 18 inches (460 mm) between the outside of the water main and the outside of the lateral. This shall be the case where the water main is either above or below the sewer lateral. The crossing shall be arranged so that the lateral joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a lateral, adequate structural support shall be provided for the lateral to maintain line and grade.

When it is impossible to obtain proper horizontal and vertical separation

as stipulated above, one of the following methods must be specified:

- a. The service lateral shall be designed and constructed equal to water pipe, and shall be pressure tested at 150 psi (1034 kPa) to assure water tightness prior to backfilling.
- b. Either the water main or service lateral line may be encased in a watertight carrier pipe which extends 10 feet (3 m) on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of materials approved by the regulatory agency for use in water main construction.

C. Minimum Depth

In general, sewers shall be sufficiently deep so as to receive sewage from the first floor of all places served by the sewers. No below ground floors may be directly connected via a gravity sewer service lateral to the gravity sewer main unless the floor is 1 foot above the rim of the upstream manhole. The service laterals shall have a minimum earthen cover of 3 feet unless waived by the Engineer or Superintendent. The lateral shall have minimum cover as established by Ten State Standards when installed under small stream or ditch crossings. The developer shall construct the service laterals at reasonable depths to avoid interference with other utilities or drainage structures.

D. Minimum Pipe Sizes and Slopes

At a minimum, four (4)-inch diameter building sewers will be allowed for single family dwellings. All commercial, industrial, and multi-family dwellings will be required to use six (6)-inch diameter laterals. The size of building sewer used for a particular development shall be consistent throughout. Where required on a service lateral, a cleanout shall be provided that is the same diameter as the lateral. The minimum slope a service lateral can be installed is 1/8" per foot

E. Grease Traps

1. General

Grease traps shall be installed at any commercial kitchen or food service business which produces waste that may contain large amounts of grease, fat or oil. These traps shall remove the grease before it enters the sanitary sewer system. Wastes from sinks, dishwashers and kitchen floor drains should be combined and routed through the grease trap prior to entering the sanitary sewer system. The tank size shall be based on design criteria set forth in Bulletin S.E. 13 from the Indiana State Board of Health, latest edition. The number of meals per hour used to size the trap shall not be less than the total seating capacity of the restaurant. Typical detail is shown on Figure 5-9C. The length to width ratio for grease traps shall not be less than 2:1.

The recommended grease trap size may be calculated as follows:

$$\text{Tank Size (in gallons)} = \text{Meals Served During Peak Hour} \times \text{Waste Flow Rate Factor} \times \text{Retention Time Factor} \times \text{Storage Factor}$$

Waste Flow Rate Factor

a. Commercial kitchen with dishwashing machine	6	
b. Commercial kitchen without dishwashing machine		5
c. Single service kitchen	2	
d. Food waste disposal only	1	

Retention Time

a. Commercial kitchen waste	2.4
b. Single service kitchen	1.5

Storage Factor

a. Fully equipped commercial kitchen having	
8-hour operation	1
16-hour operation	2
24-hour operation	3
b. Single service kitchen	1.5

2. Bedding, Backfill, Excavation, and Installation

The area excavated for the grease trap shall be over-cut by a minimum one (1) foot on all sides. The bottom of the excavation shall be located at a minimum set back slope of 1:1 from the base of the building foundation. The base for the trap shall consist of a minimum of twelve (12) inches of compacted No. 8 stone. Backfill shall consist of No. 8 stone and will extend to a point twelve (12) inches below the final grade. The remaining twelve (12) inches shall be filled with topsoil. The grease trap vault shall be waterproofed with coal tar epoxy or approved equal. A six (6) inch diameter cleanout is required to be installed within three (3) feet of the outlet side of the grease trap. If the trap is installed in an area subject to vehicular traffic, it must be designed to sustain HS 20 loading requirements. (Minimum 16,000 LBS dynamic wheel load).

12C MATERIALS

12C.01 General

Sanitary sewer service laterals shall meet the minimum requirements of SDR 26, bell and spigot type PVC pipe. Joints shall be SDR-26 gasket push-on, compression type, conforming to ASTM D 3212. Gaskets shall conform to ASTM F 477. SDR-26 factory

made wye connections shall be provided at the connection point with the municipal sewer line. Vitrified Clay Pipe (VCP) shall not be permitted for building sewer (lateral) construction. Where allowed, saddle connections to facilitate lateral connections to the sanitary sewer shall conform to ASTM D3034.

Ductile iron service laterals shall be cement coated and conform to the ANSI A21.51 and AWWA C 151, latest revisions. Ductile iron pipe shall be Class 350. Fittings shall be standardized for the type of pipe and joint specified and shall comply with ANSI A21.10 and AWWA C110. Fittings shall be either mechanical joint or push-on type. Pipe joints shall use O-ring gaskets in accordance with ANSI 21.11 and AWWA C 111.

At a minimum, four (4)-inch diameter building sewers will be allowed for single family dwellings. All commercial, industrial, and multi-family dwellings will be required to use six (6)-inch diameter laterals. The size of building sewer used for a particular development shall be consistent throughout.

Where required on a service lateral, a cleanout shall be provided that is the same diameter as the lateral and is made of the same material as the main line pipe. Said cleanout shall include a watertight, pop-off lid and conform to the Service Connection detail. The pop-off lid for the cleanout located approximately three (3) feet away from the building exterior may be a loose fitting cap or lid to provide a backup relief point. All additional cleanout lids should be water-tight detachable lids.

Any cleanout installed at the right-of-way where the lateral crosses a roadway shall be protected by a Neenah Foundry Company Lamphole Frame R-1976 or East Jordan 1578. See Section 12E for installation specifications and Figure 5-8A for details.

In the case of existing lateral connection made with dissimilar pipe, solid mechanical couplers shall be utilized at the connection point to form a rigid, watertight seal.

12D INSTALLATION / CONSTRUCTION OF SANITARY SEWER SERVICE LATERALS

12D.01 General

- A. This section shall provide general minimum requirements for the installation and construction of Sanitary Sewer Service Laterals for the Town of Newburgh.

12D.02 Excavation

A. Dewatering and Control of Surface Water

Where groundwater is encountered, the Contractor shall make every effort necessary to secure a dry trench bottom before laying pipe. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, well points, etc. necessary to depress and maintain the groundwater level below the base of the excavation. If the Contractor is unable to remove the

standing water in the trench, the Contractor shall over-excavate the proposed bottom grade of the sewer bedding, and place not less than three (3) inches of Class No. 2 crushed stone (Indiana Department of Transportation aggregate Classification) in the over-excavated area.

The Contractor shall keep the site free of surface water at all times and shall install drainage ditches, dikes, pumps and perform other work necessary to divert or remove rainfall and other accumulation of surface water from excavations. The diversion and removal of surface and/or groundwater shall be performed in a manner which will prevent the accumulation of water within the construction area.

UNDER NO CIRCUMSTANCES SHALL SURFACE WATER AND/OR GROUNDWATER BE DISCHARGED TO, DISPOSED OF, OR ALLOWED TO FLOW INTO THE TOWN'S SANITARY SEWER SYSTEM.

B. Excavation

1. Pavement Cutting

Prior to excavating paved areas all excavation edges falling within the pavement shall be saw cut in a neat, straight manner. Cutting shall be performed with a saw designed specifically for this purpose. The cut shall penetrate the entire pavement thickness where possible. If the existing pavement is more than 6 inches thick, then a cut of not less than 6 inch depth shall be made. If pavement cuts are made in streets which are opened to traffic prior to excavation, then the cuts shall be thoroughly filled with sand and maintained full until the excavation is performed.

2. Protection of Existing Improvements

Before any excavation is started, adequate protection shall be provided for all existing utilities and Town structures.

3. Utility Interruption

The Contractor shall proceed with caution in the excavation and preparation of the trench or pit so that the exact location of underground structures may be determined. Prior to proceeding with trench excavation the Contractor shall contact all utility companies in the area to aid in locating their underground services.

The Contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, he shall immediately notify the responsible official of the organization operating the utility interrupted. The Contractor shall lend all possible assistance in restoring services and shall assume all costs, charges, or claims connected with the interruption

and repair of such services.

4. Open Cut Excavation

Open cut excavation shall be safely supported and of sufficient width and depth (and only to such width and depth) to provide adequate room for the construction or installation of the work to the lines, grades and dimensions.

a. Trench Dimensions

The bottom width of the trench at and below the top of the pipe and inside the sheeting and bracing, if used, shall not exceed the recommendations as contained in the applicable ASTM Standard for the pipe being used.

Trench sheeting and bracing or a trench shield or box shall be used as required by the rules and regulations of OSHA. The bottom of the trench shall still meet the above standards.

If the trench widths are exceeded with the written permission of the Town, the pipe shall be installed with a concrete cradle or with concrete encasement or other ASTM approved methods as approved by the Town Engineer.

b. Excavations With Sloping Sides, Limited

The Contractor may, at his option, where working conditions and right of way permit (as determined by the Town Engineer), excavate pipe line trenches and pits for structures with sloping sides, but with the following limitations:

- (1) In general, only braces and vertical trenches will be permitted in traveled streets, alleys, narrow easements and for pit excavations more than 10 feet deep.
- (2) Where pipe line trenches with sloping sides are permitted, the slopes shall not extend below the top of the pipe, and trench excavations below this point shall be made with near vertical sides with widths not exceeding those specified herein before.
- (3) Slopes shall conform to all OSHA regulations.

5. Earth Excavation

Earth materials shall be excavated so that the open cuts conform with the required lines, grades and dimensions.

- a. Unsuitable Foundation: When the bottom of the excavation is unsuitable as a foundation, it shall be excavated below grade and then refilled with concrete or crushed stone to the grade as the Town or its representative may direct. The crushed stone refill shall be mechanically compacted in six (6) inch layers or as directed by the Town.
- b. Unauthorized Excavation: Unauthorized excavation below grade shall be filled with crushed stone or concrete and compacted as ordered and directed by the Town or its representative.
- c. Excavated Earth For Backfill: Excavated earth materials may be used for backfill subject to the approval of the Town Engineer. Such material may be used only where its class is allowed.

6. Water Line Protection

- (a) Horizontal and Vertical Separation – Sanitary sewer service laterals shall be laid at least 10 feet (3 m) horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot (3 m) separation, the appropriate reviewing agency may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the lateral closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the lateral and at an elevation so the bottom of the water main is at least 18 inches (460 mm) above the top of the lateral.

If it is impossible to obtain proper horizontal and vertical separation as described above, both the water main and service lateral must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards of the agency and be pressure tested to 150 psi (1034 kPa) to assure watertightness before backfilling.

- (b) Crossings – Sanitary sewer service laterals crossing water mains shall be laid to provide a minimum vertical distance of 18 inches (460 mm) between the outside of the water main and the outside of the lateral. This shall be the case where the water main is either above or below the lateral. The crossing shall be arranged so that the lateral joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a lateral, adequate structural support shall be provided for the lateral to maintain line and grade.

When it is impossible to obtain proper horizontal and vertical separation as stipulated above, one of the following methods must be specified:

- (1) The sanitary sewer service lateral shall be designed and constructed equal to water pipe, and shall be pressure tested at 150 psi (1034 kPa) to assure water tightness prior to backfilling.
- (2) Either the water main or the lateral line may be encased in a watertight carrier pipe which extends 10 feet (3m) on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of materials approved by the regulatory agency for use in water main construction.

12D.03 Bedding and Backfill

A. General

All trenches or excavations shall be backfilled to the original surface of the ground or such other grades as required or directed. In general the backfilling shall be carried along as speedily as possible in order to avoid open excavations. Bedding requirements specified in this section shall be applicable to all lateral lines, whether located in public easement / right-of-way or private property. See standard drawings 5-10 and 5-11 for bedding, haunching, and initial backfill requirements.

B. Backfill Materials

The following materials shall be used for backfill in accordance with and in the manner indicated by the requirements specified herein.

- | | |
|-------------|---|
| Class I - | Angular, 6 to 40 mm (1/4 to 1 ½ inch), graded stone such as crushed stone. |
| Class II - | Coarse sands and gravel with maximum particle size of 40 mm (1 ½ inch), including various grades of sands and gravel containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class. |
| Class III - | Fine sand and clayey gravel including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil types GM, GC, SM and SC are included in this class. |
| Class IV - | Silt, silty clays and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH and CL are included in this class. These materials are not recommended for bedding. This class shall also include any excavated material free from rock (3 inches and larger), concrete, roots, stumps, rubbish, |

frozen material and other similar articles whose presence in the backfill would cause excessive settlement.

C. **Eliminated**

D. **Bedding**

1. **Rigid Pipe and Conduit Bedding**

For purposes of this specification, rigid pipe and conduits shall include those made of ductile iron and other materials as determined by the Town.

All rigid conduit and pipe shall be laid to the lines and grades unless otherwise directed by the Town. All rigid conduit and pipe shall be bedded in compacted Class I or II material, placed on a flat trench bottom. The bedding shall have a minimum thickness of 4-inches or one-fourth (1/4) the outside pipe diameter below the pipe and shall extend halfway up the pipe barrel at the sides. All material shall be placed in the trench in approximately six (6) inch layers. Each layer, shall be leveled and evenly distributed on both sides of the pipe so as not to disturb, displace or damage the pipe and shall be thoroughly compacted. When Class I or II materials are used compaction may be accomplished by hand or mechanical tamping or by "walking" the material in. Bedding from the halfway point on the pipe to a point twelve (12) inches above the top of the pipe shall be a Class I, II, III, or IV material placed in six (6) inch layers and thoroughly compacted to prevent settlement. Class III and IV material shall not be used when the trench is located in an area subject to vehicular traffic.

2. **Flexible and Semirigid Conduit Bedding**

For purposes of this specification, flexible and semirigid conduits and pipes shall include those made of PVC, HDPE, PVC Truss, and other materials as determined by the Town Engineer.

All flexible and semirigid pipe shall be laid to the lines and grades unless otherwise directed by the Town. All flexible and semirigid conduit shall be bedded in compacted Class I or Class II material, placed on a flat trench bottom. The bedding shall have a minimum 4-inch thickness or one-fourth (1/4) the outside pipe diameter below the pipe and shall extend to twelve (12) inches above the top of the pipe level the full width of the trench. All material shall be placed in the trench in a maximum of six (6) inch layers (before compaction). Each layer, shall be leveled and evenly distributed on both sides of the pipe so as not to disturb, displace or damage the pipe and shall be adequately compacted. When Class I materials are used compaction may be accomplished by hand or

mechanical tamping or by "walking" the material in. When Class II materials are used, compaction shall be accomplished by hand or mechanical tamping to meet the maximum allowable deflection of five percent (5%).

E. Backfill Above Pipe

1. Method A Backfill in Areas Not Subject to Vehicular Traffic

For purposes of this specification, trenches shall be considered subject to vehicular traffic if all or any portion of the excavation is located within four (4) feet of a roadway or alley which is routinely traveled by powered vehicles. In the event of any question regarding the susceptibility of an area to traffic, the Town's decision shall govern.

The trench between a level twelve (12) inches above the top of the pipe and the ground surface shall be backfilled with Class I, II, III or IV materials, as described above, deposited with mechanical equipment in such a manner that it will "flow" onto the bedding and not free fall. The Contractor shall consolidate the backfill by the back and forth travel of a suitable roller, wheeled device or other similar heavy equipment until no further settlement is obtained. Heavy equipment shall not be used until there is a cover of not less than three (3) feet over the pipes. To assist in promoting maximum settlement, the surface of the trench shall be left in a slightly rounded condition. Periodical dressing of the backfill in the trench to promote the drainage and safety conditions shall be made during the course of the work.

2. Method B Backfill in Areas Subject to Vehicular Traffic (Mechanical Compaction)

The trench between a level of twelve (12) inches above the top of the pipe and the surface, which are located in areas subject to or possibly subject to vehicular traffic, shall be backfilled with Class I or II materials. The initial lift of backfill shall be placed in a manner to minimize lumps and voids, but not requiring mechanical tampers. Equipment for compaction shall be used on backfill after there are two (2) feet of backfill over pipe barrel. Additional lifts of no more than six (6) inches in depth shall be placed and compacted with compaction equipment to a depth of twelve (12) inches below finished grade. Completion of backfill to finished grade shall be done with compacted aggregate. Compacted aggregate shall conform to the Indiana Department of Transportation Standard Specifications for Compacted Aggregate Base. The aggregate shall be thoroughly compacted by means of compaction equipment. The compacted aggregate is intended to serve as the base for the permanent pavement replacement. Any

settlement that occurs shall be immediately refilled and compacted with aggregate. The Contractor shall apply an approved dust preventative as necessary to avoid or eliminate dust complaints from nearby residents.

F. Temporary Surfaces Subject to Traffic

The Contractor shall open streets to traffic immediately after completing the backfill operation. He shall accomplish this by installing the compacted aggregate base immediately after granular backfill. The use of Class II backfill as a temporary surface is specifically prohibited.

G. Maintaining Trench Surfaces

All surface settlement of the backfill along trenches located beneath streets, roads, alleys, driveways and parking lots which are subject to traffic shall be kept filled level with or slightly above the original paved surface at all times with compacted aggregate base material until the permanent pavement is satisfactorily restored. When temporary asphalt pavement is used, depressions and "pot holes" shall be promptly filled with the temporary asphalt material. Special attention shall be given by the Contractor to the timely and proper maintenance, leveling and grading of the surface of all backfilled trenches, especially those subject to traffic and especially following rains. The surface of streets, roads and alleys shall be maintained smooth and free of ruts and water trapping depressions by periodic power blading, scarifying; and/or filling settled areas, ruts, pockets, or holes with compacted aggregate base material or temporary asphalt where used.

As a dust preventive, the Contractor shall apply, calcium chloride over the surface of the compacted aggregate base in such amounts and at such times as are necessary to avoid or eliminate dust complaints from nearby residents. In event of any question regarding the existence or nonexistence of a dust nuisance, the Town's decision on the matter will govern. The material used shall be Regular Flake Calcium Chloride having a minimum chemical content of Calcium Chloride of seventy-seven percent (77%). Unless otherwise specified or ordered by the Town, the rate of application shall be one and one half (1 ½) pounds per square yard of surface covered.

Wherever surface settlement is not important, unless otherwise specified or directed, the backfill shall be neatly rounded over the trench to a sufficient height to allow for settlement to grade after consolidation. Just prior to the completion of all work under the contract, any surface settlement below original ground surface shall be refilled in a satisfactory manner, and reseeded as specified if required.

12D.04 Laying of Sanitary Sewer Service Laterals

A. General

The sanitary sewer service lateral shall connect to the public sewer at a mainline fitting as shown on the approved record drawings and shall be laid with the bell end pointing upgrade. In the event that no manufactured fitting exists in the sanitary sewer main, and if approved by the Town, a service connection may also be made using a saddle connection or by cutting into the sewer and installing a manufactured fitting using a solid sleeve coupling.

Connections to sanitary manholes shall not be made without the prior approval of the Town. Building sewers shall connect to the manhole, when approved, at the manhole invert. Under these circumstances, the manhole base shall be pre-formed with a gasketed connection for the lateral line. The invert shall also be formed at the flow line to accept the lateral sewer connection. No inside drop connections shall be allowed without the prior approval of the Town.

The service laterals shall have a cleanout located approximately three (3) feet from the buildings exterior wall at the start of the sewer and extend to grade. This cleanout will be considered the connection point to the building's plumbing. The cleanout shall be fitted with a pop-off lid and shall be constructed such that it is located below the floor level serviced by the gravity sewer to serve as a relief point in the event the municipal sanitary sewer backs up. The pop-off lid may be a loose fitting lid. It is the recommendation of the Newburgh Sewer Department that additional cleanouts should be installed along the lateral at intervals of 100 feet or less. These cleanouts should be installed with a water-tight detachable lid instead of the pop-off lid.

Whenever a service lateral has to go under street pavement to get to the building served, an additional cleanout shall be installed at the edge of the right-of-way, on the building private property. This cleanout shall be the same size as the lateral and shall be protected by a Neenah Foundry Company Lamphole Frame R-1976 or East Jordan 1578. The top of the frame shall be at grade and centered in a concrete pad, minimum dimensions 18" x 18" x 3". See figure 5-8A for details.

B. Rigid Conduit Installation (Ductile Iron Pipe)

All rigid conduit for sewer pipe shall be laid to the lines and grades, unless otherwise directed by the Town Engineer. All rigid pipe shall be laid in accordance with the details for the First Class Pipe Laying Method.

This First Class Pipe Laying Method may be achieved by Class B bedding methods as shown in the ASCE Manual of Practice No. 37, latest edition. Under this Class B bedding Method, the pipe shall be bedded in compacted granular material (Class I or Class II) placed on a flat trench bottom. The bedding shall have a minimum thickness of one-fourth ($1/4$) the outside pipe diameter below the pipe and shall extend halfway up the pipe barrel at the sides. All granular bedding material shall be placed in the trench in approximately six (6) inch layers. Compaction shall be accomplished by hand or mechanical tamping or by "walking" the granular material in. From the halfway point on the pipe (Springline) to a point twelve (12) inches above the top of the pipe, backfilling methods A or B or C shall be used depending on the trench location. In addition, all rigid conduits shall be installed in accordance with "Standard Recommended Practice for Installing Vitrified Clay Sewer Pipe" (ASTM Designation C 12 and ASTM D2321).

The laying of pipe in finished trenches shall be commenced at the lowest point, proceeding upstream, with the spigot ends pointing the direction of flow. No blocking under pipes will be permitted, except as approved by the Town for pipe to be encased in concrete or lay in concrete cradles.

The practice of blocking pipe up to grade with bedding material, then backfilling under is prohibited. The entire length of the bed section is to be at proper grade before installing pipe.

The supporting strength of the pipe is dependent upon its foundation and trench width. To develop normal strength, the pipe shall have a firm uniform foundation under the entire lower quadrant of the barrel. No weight should be supported by the bell. The maximum trench width as recommended by ASTM at the level of the top of the pipe shall be maintained as narrow as possible, taking into consideration the limitation of the excavation equipment except as may be permitted by the Town Engineer upon investigation of the soil conditions, laying methods and earth loadings.

All pipes and fittings shall be carefully inspected before being laid, and no cracked, broken or defective pipe or fitting shall be used in the work. All pipe shall be carefully inserted in the bell in such a manner that there will be no unevenness of any kind along the bottom half of the pipes and so that there is a uniform joint space all around.

All pipe that is field cut shall have the homing-marks reestablished, insuring for proper seating depths. Pipes that are field cut shall have the cut ends retapered, by grinding or filing, as close to the original taper provided by the manufacturer as possible. When homing pipe with a spud-bar or other mechanical equipment, other than by hand, place a piece of wood between pipe and tool to prevent damage to bell end-section.

Pipe laid in open cut shall have all trench spaces and voids solidly and completely filled with suitable earth materials from the excavations which shall be thoroughly and solidly rammed into place, unless otherwise specified.

The ends of the pipes shall be protected to prevent the entrance of dirt or other foreign substances. Such protection shall be placed at night or whenever pipe laying is stopped for any reason. Suitable plugs designed for use with the pipe material shall be provided and properly secured and used to cap all slants and branches.

C. Flexible Conduit Installation (PVC, PVC-Truss, and HDPE Pipe)

Plastic sewer pipe (PVC) and other flexible pipe shall be carefully installed in accordance with the above specification for Rigid Conduit Installation, except where the following paragraphs modify those specifications.

Flexible conduit for sewer pipe shall be installed in accordance with "Underground installation of Flexible Thermoplastic Sewer Pipe" ASTM Designation C 2321.

The Contractor shall take special precautions when homing PVC pipe not to over-seat past the home-marks. The pipe installation must include adequate bedding to hold its proper placement, prior to installing the next section.

The Contractor shall use caution when stringing thermoplastic pipe. Excessive spans, in sunlight, will cause bowing damage; and said damaged spans will be rejected.

In addition to the construction and testing procedures outlined in other sections of these specifications, the Contractor shall be required to install the flexible pipe in such a manner so that the diameter deflection of the pipe shall not exceed five percent (5%). Bedding materials surrounding the pipe shall be compacted to the densities required to meet the five percent (5%) maximum deflection requirement. The area requiring compaction shall be included in the bed and side fill material and also the material placed above the pipe for a distance of twelve (12) inches over the top of the pipe.

The First Class Pipe Laying Method for Flexible conduit may be achieved by Class B Bedding Methods as shown in the ASCE Manual of Practice No. 37, latest edition. Under this class B Bedding Method, the pipe shall be bedded in compacted granular material (Class I or II) placed on a flat trench bottom. The bedding shall have a minimum thickness of one-fourth (1/4) the outside pipe diameter below the pipe and shall extend twelve (12) inches above the top of the pipe level and full width of the trench. All granular bedding material shall be placed in the trench in approximately six (6) inch layers.

Compaction shall be accomplished by hand or Mechanical Tamping or by "Walking" the granular material in for Class I materials only. When Class II materials are used compaction shall be accomplished by hand or mechanical tamping. Backfill from a point twelve (12) inches above the top of the pipe to the trench surface shall be in accordance with "backfilling Methods A or B or C" depending on the trench location.

Plastic pipe shall not be blocked, except where the plans or specifications call for concrete encasement or concrete cradles for the pipe. Blocks shall be encased in concrete also, or removed. Where plastic pipe is to be installed below maximum ground water table, adequate weights shall be provided to prevent flotation of the pipe.

Pipe and fittings shall be carefully inspected before being installed. Cracked, broken or otherwise defective pipe shall not be used.

12E SUBMERSIBLE SEWAGE GRINDER PUMPS

12E.01 General

This section pertains to the requirements for any private sanitary lift stations. The Town shall review and approve the use of any lift station. The owner must show that it is not physically possible or economically feasible to provide gravity service into a public sewer.

Contractor shall furnish all labor, materials, equipment and incidentals required to provide submersible centrifugal sewage grinder pump(s). Simplex grinder pump systems will be allowed for single family residences. Any commercial, industrial or multi- family dwellings shall be constructed utilizing a duplex pump system.

12E.02 Operating Conditions

Prior to installation, the Contractor shall submit the following information for each pump to the Town Engineer for review and approval.

- A. Type of pump, manufacturer and model number
- B. Pump capacity in gallons per minute (GPM).
- C. Total dynamic head (TDH) (Static head and friction loss calculated to point of discharge into gravity system).
- D. Pump Size.
- E. Impeller Size.
- F. Pipe size (must be sized for minimum velocity of 2 FPS)
- G. Motor RPM, voltage, phase, and cycle.
- H. Pump Curves with the appropriate flow rate and head characteristics plotted.

- I. Catalog cut sheet of selected type of pump.
- J. Specifications for wet well, pump and all appurtenances.
- K. Specifications for control panel and alarm

12E.03

Grinder Pump, Control Panel, Wet Well and Appurtenances

A. Grinder Pump

- 1. The pump shall be a centrifugal, grinder, wastewater type or other as approved by the sewer department. The pump and motor shall be specifically designed so that they may be operated partially dry or completely submerged in the liquid being pumped.
- 2. The impeller shall be designed for rough duty service.
- 3. The grinder unit shall be capable of macerating all material in normal domestic and commercial sewage including reasonable amounts of foreign objects such as small wood, sticks, plastic, thin rubber, sanitary napkins, disposable diapers and the like to a fine slurry that will pass freely through the pump and 1-1/4 inch discharge pipe.
- 4. The discharge pipe must adhere to the specifications set forth in **Section 12C Materials** and must be sized to transport the sewage at a minimum velocity of 2 FPS.

B. Control Panel

- 1. The control panel shall have a high water alarm built-in the main enclosure. The high water alarm shall consist of a flashing alarm light with red plastic cover mounted on top of enclosure such that it is visible from all directions.
- 2). A corrosion resistant junction box shall be located outside the wet well.

C. Wet Well

- 1. The contractor shall supply a wet well which adheres to the specifications set forth in **Section 7.11 Wet Well and Valve Pit** or an approved Manufacturer's packaged system.
- 2). The area excavated for the well shall be over-cut a minimum of one (1) foot on all sides. The bottom of the excavation shall be located at a minimum set back slope of 1:1 from the base of the building foundation. The base for the well shall consist of a minimum of twelve (12) inches of compacted No. 8 stone. Backfill shall consist of No. 8 stone and will extend to a point twelve (12) inches below the

final grade. The remaining twelve (12) inches shall be filled with topsoil.

- 3). Concrete must be poured around the base of the well for ballast. For the standard 24-inch diameter well, the ballast shall be 2 cubic feet of concrete per foot of basin depth.
- 4). The well shall be sized to have a 24-hour average holding capacity (from alarm-on to invert elevation of the building sewer into the wet well).
- 5). The well shall have a minimum access hole of 24 inches. All lids shall have a waterproof seal.
- 6). The connections to the wet well for the gravity lateral and force main shall be made using approved watertight flexible boot seal to prevent groundwater from entering the wet well.
- 7). Concrete wet wells will be waterproofed with coal tar epoxy or approved equal.

12F. Oil/Water Separator

1. General

Oil/Water Separators shall utilize coalescing medium for the removal of oil and sludge from the liquid wastes. Stoke's Law formula shall be the basis for design. The tank size shall be based on design criteria from the American Petroleum Institute (API) manual, adhering to provincial environmental acts and regulations when applicable.

Table based on Stoke's Law.

	Flow Rate - Gallons Per Minute										
	5	10	25	50	75	100	150	200	250	500	1000
Length (inches)	58	74	90	120	130	134	124	136	154	180	220
Width (inches)	15	26.8	37.3	36.8	37.3	49	57	64	68	84	89
Height (inches)	39	39	39	56	56	56	68	68	75	87	106
Operating Volume (Gallons)	105	250	435	785	850	1170	1652	2035	2720	4712	7550

Typical Tank Sizing Chart

2. Materials

The tank shall be made of a material suitable for underground installation, such as concrete or reinforced plastics. The tank shall be capable of handling liquids with a specific gravity up to 1.1 and be vented to atmospheric pressure. Separator shall be inert to petroleum products

and have baffles to limit migration of solids and sludge to the discharge piping. A manhole with a watertight cover shall be installed on the top of the separator tank.

The coalescing media shall be oleophilic plate packs resistant to plugging and fouling. Packs shall be removable for servicing and re-installation. Coalescing plate packs and associated mounting hardware shall be rustproof.

3. Submittals

The owner shall submit to the town (3) copies of shop drawings. The shop drawings shall include drawings showing all critical dimensions and locations of all fittings and accessories, and any manufacturer literature and maintenance information (O&M Manuals). The basis for the design shall be documented with supporting assumptions and calculations.

4. Certified Waste Hauling Contract

The owner shall provide written documentation that they have engaged the services of a certified waste hauler. The service agreement shall stipulate the intervals in which the tank will be serviced. Service intervals shall not exceed the tank manufacturer's recommendations.

APPENDIX A

APPENDIX “A”
Standard Details

Appendix A — Standard Details

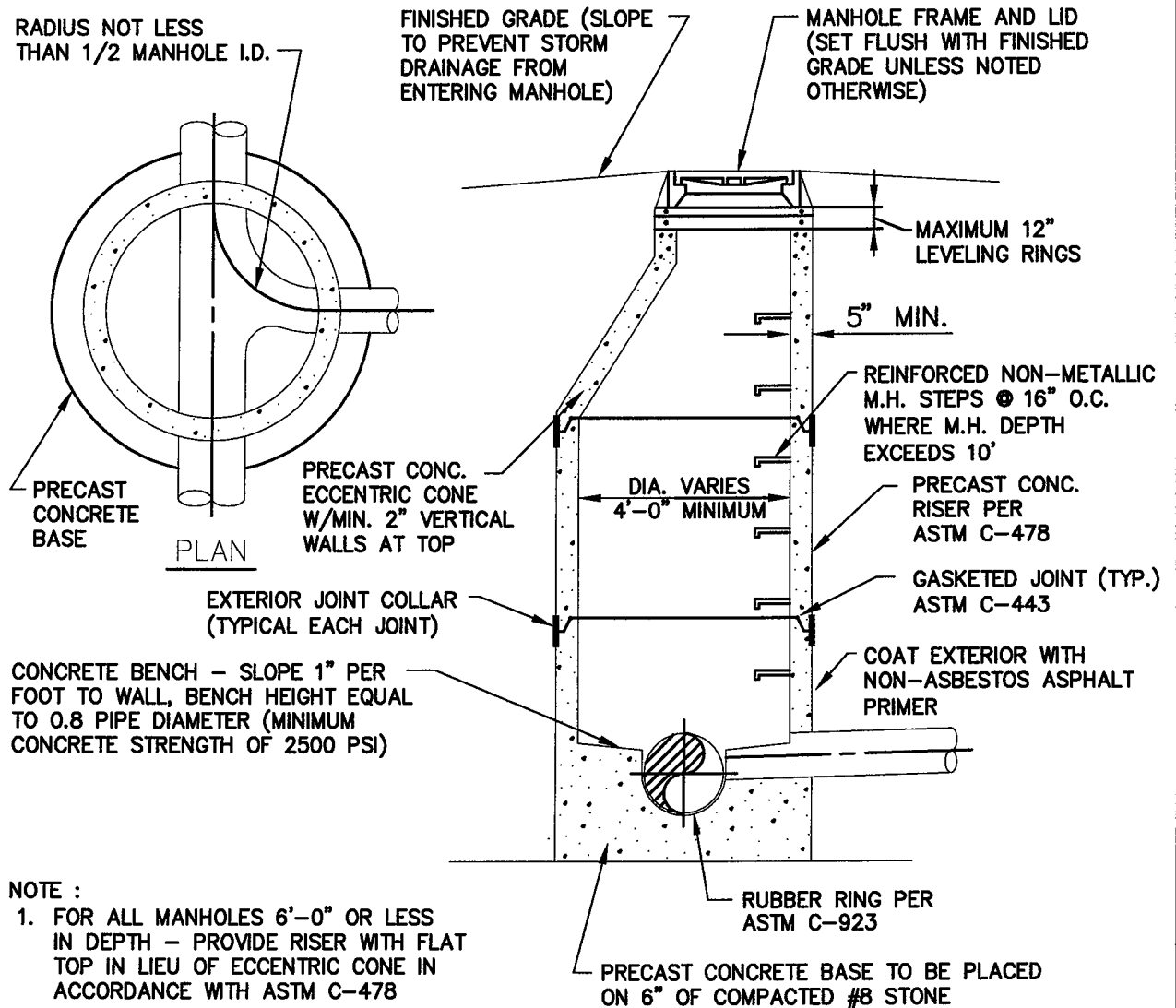
<u>Figure No.</u>	<u>Title</u>
<u>A1</u>	<u>Manhole Details</u>
A1.1	Standard Sanitary Manhole Detail
A1.2	Exterior Joint Collar Detail
A1.3	Sanitary Drop Manhole Detail
A1.4	Sanitary Manhole Installed over Existing Sewer (Only with Special Approval from Utility)
A1.5	Typical Existing Manhole Entry Detail
A1.6	Sanitary Sewer Manhole Frame and Cover
A1.7	Waterproof Sanitary Manhole Frame and Bolted Lid
<u>A2</u>	<u>Lateral Details</u>
A2.1	Service Connection for Shallow Sewers (Alt #1 and Alt #2)
A2.2	Industrial Sewer Service Connection
A2.3	Lateral Connection into Existing Sewer
A2.4	Typical Grease Trap
A2.5	Typical Oil/Water Separator
A2.6	Lamp Frame for Cleanouts
<u>A3</u>	<u>Pipe Bedding Details</u>
A3.1	First Class Pipe Laying Method for Rigid Conduits (RCP & DI)
A3.2	First Class Pipe Laying Method for Flexible Conduits (PVC, CMP, RPVC, ABS, and HDPE)
A3.3	PVC Force Main Pipe Trench Detail
<u>A4</u>	<u>Surface Restoration Details</u>
A4.1	Surface Restoration Detail
A4.2	Sidewalk Restoration Detail
<u>A5</u>	<u>Force Main Details</u>
A5.1	Thrust Blocking Details for Pressure Main
A5.2	Force Main Marking Detail
A5.3	Air Release Valve
A5.4	Standard External Force Main Drop into Sanitary Manhole
A5.5	Standard Internal Force Main Drop into Sanitary Manhole (Only with Special Approval from Utility)
<u>A6</u>	<u>Cased Pipe and Stream Crossing Details</u>
A6.1	Railroad Pipe Crossing Detail
A6.2	State Highway Boring/Casing Detail
A6.3	Stream Crossing Detail
<u>A7</u>	<u>Lift Station Details</u>
A7.1	Typical Lift Station Section

A7.2	Typical Pressure Gage Installation Layout
A7.3	Lift Station Control Building Section
A7.4	Lift Station Control Building Elevation
A7.5	Lift Station Control Building Plan
A7.6	Typical Pump Station Service Pole for Pump Station Services
A7.7	Typical Pump Station Power Distribution Diagram
A7.8	Typical Pump Station Electrical and Pump Control Mounting Detail
A7.9	Bypass Pump Bauer Connection – Wet Well
A7.10	Bypass Pump Bauer Connection – Valve Pit
A7.11	Standard Metering Manhole

A8

Traffic Control Details

A8.1	Traffic Control
A8.2	Traffic Control Sign Details
A8.3	Traffic Control Sign Details
A8.4	Traffic Control Sign Standard Details
A8.5	Traffic Control Device Legend and General Notes
A8.6	Traffic Control Device Locations
A8.7	Traffic Control Device Locations
A8.8	Traffic Control Barricade Details
A8.9	Traffic Control Barricade Type I and II Details
A8.10	Traffic Control Barricade Type III-B Details
A8.11	Traffic Control Cone/Drum/Tubular Marker Details
A8.12	Traffic Control Concrete Barrier General Notes
A8.13	Traffic Control Concrete Barrier Details



STANDARD SANITARY MANHOLE DETAIL

NO.	REVISION	DATE
1	EXT. CHIMNEY	02-20-02
2	DELETE REV. 1	12-10-02
3	REMOVE NON-SHRINK GROUT	08-22-07

TOWN of NEWBURGH, INDIANA

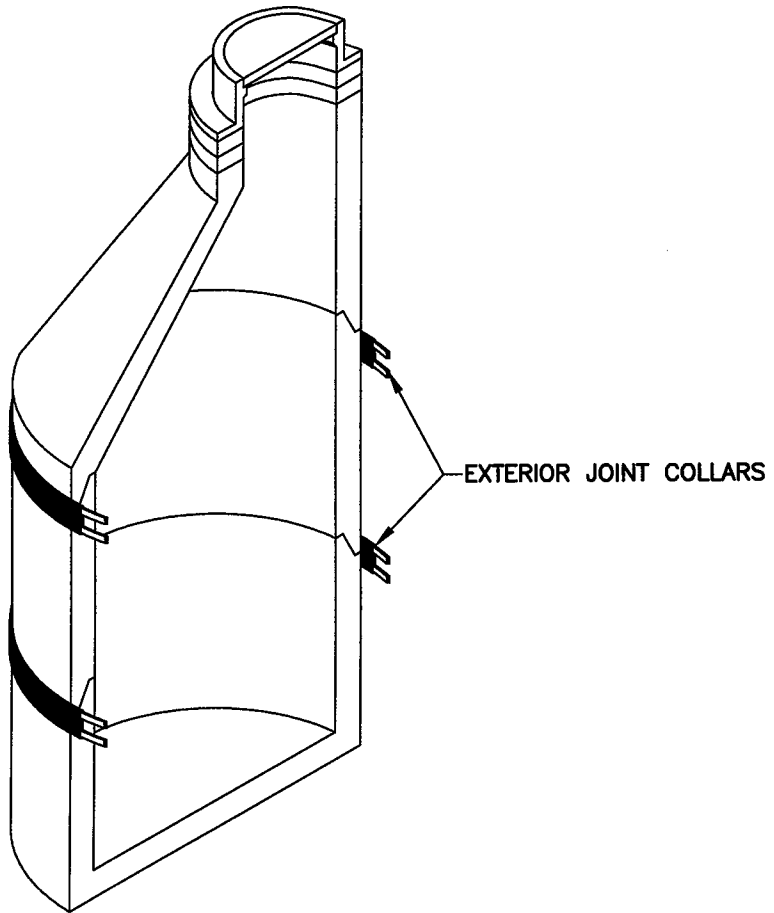
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APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A1.1



EXTERIOR JOINT COLLAR DETAIL

NO.	REVISION	DATE
1	EXT. CHIMNEY	02-20-02
2	DELETE 1	12-10-02

TOWN of NEWBURGH, INDIANA

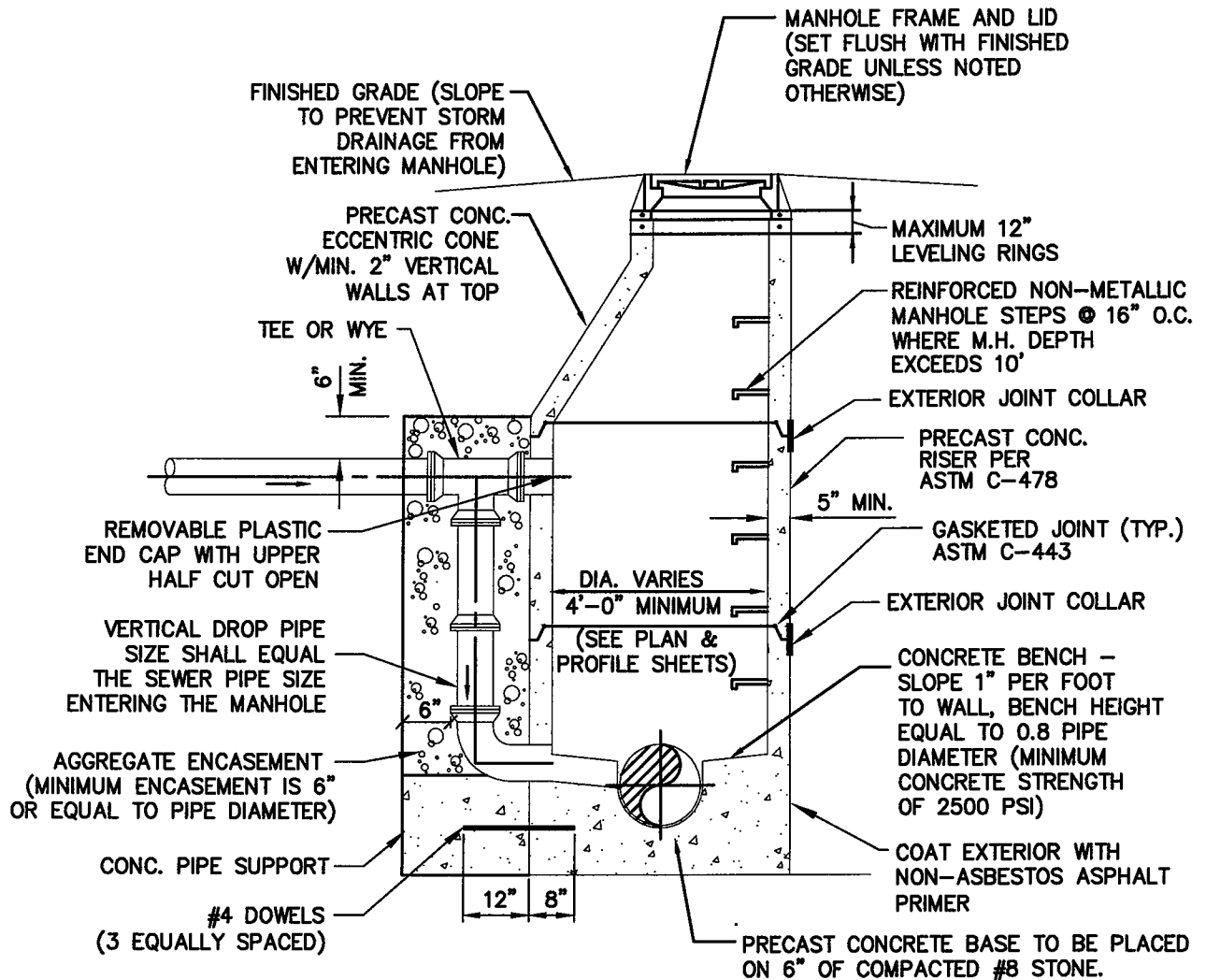
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APPROVED _____ DATE _____

FIGURE

A1.2



NOTE :

1. FOR ALL MANHOLES 6'-0" OR LESS IN DEPTH - PROVIDE RISER WITH FLAT TOP IN LIEU OF ECCENTRIC CONE IN ACCORDANCE WITH ASTM C-478
2. THE CROWN OF THE INFLUENT PIPE SHALL BE AT OR ABOVE THE CROWN OF THE OUTLET PIPE
3. DROP MANHOLES SHALL BE USED WHENEVER THE DISTANCE FROM THE INVERT OF THE INCOMING LINE AND BOTTOM OF MANHOLE IS GREATER THAN TWO FEET.

NON-SHRINKING GROUT SHALL BE APPLIED AROUND ALL PIPES

SANITARY DROP MANHOLE DETAIL

NO.	REVISION	DATE
1	EXT. CHIMNEY	02-20-02
2	DELETE REV. 1	12-10-02
3	ENCASEMENT	02-18-02
4	REMOVE NON-SHRINK GROUT	08-22-07
5	ADD CONC. BASE AND #4 DOWELS	08-22-07

TOWN of NEWBURGH, INDIANA

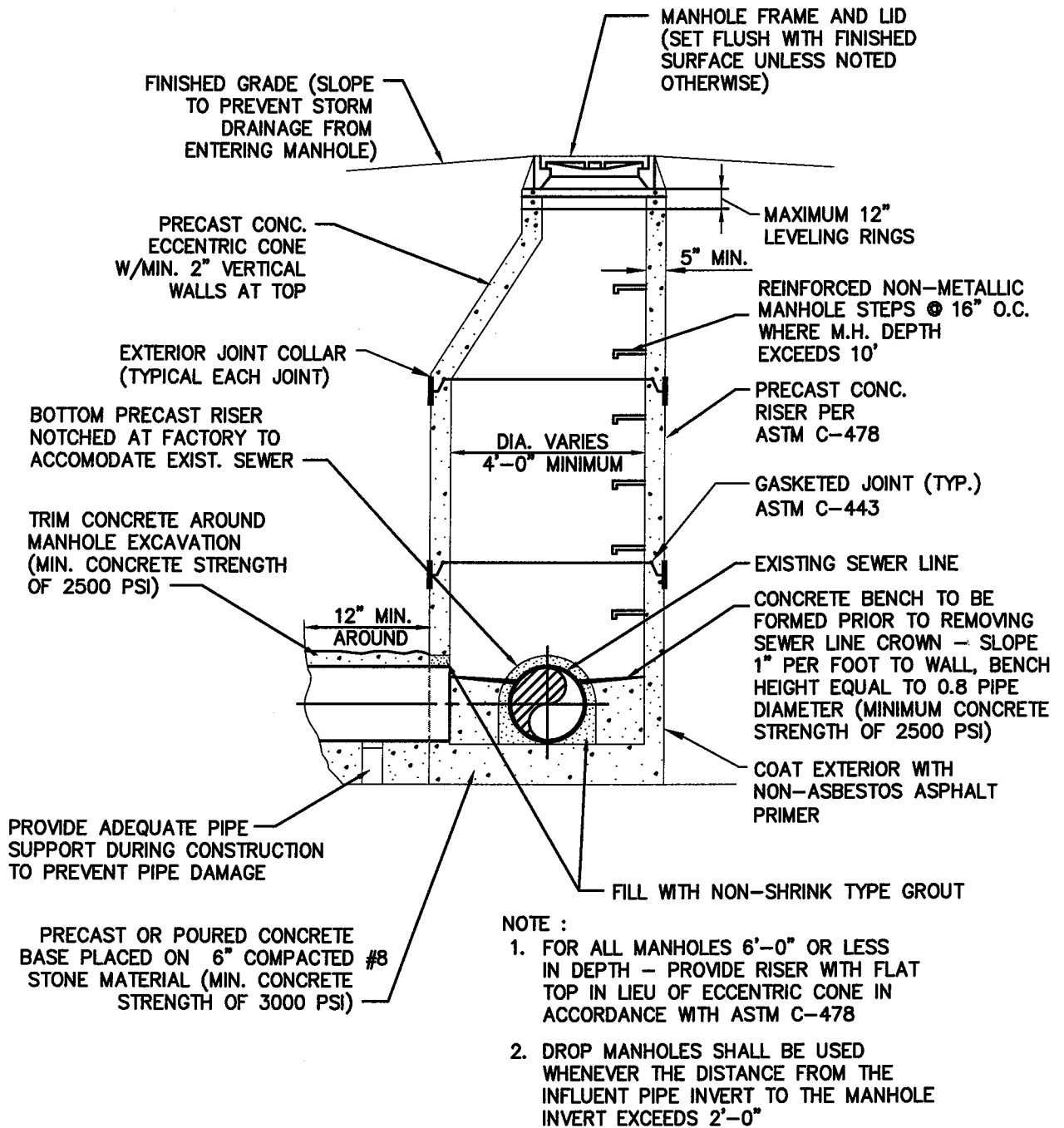
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APPROVED _____ DATE _____

FIGURE

A1.3



GAP BETWEEN FACE OF CONC. BASE AND PIPE SHALL NOT EXCEED 1"

SANITARY MANHOLE INSTALLED OVER EXISTING SEWER (ONLY WITH SPECIAL APPROVAL FROM UTILITY)

NO.	REVISION	DATE
1	EXT. CHIMNEY	02-20-02
2	DELETE 1	12-10-02
3	MONITORING M.H.	01-03
4	DELETE 3	03-03
5	REMOVE NON-SHRINK GROUT	08-22-07
6	ADD 2" GAP AND SECOND ACTION	08-22-07
7	BASE AND PIPE GAP	03-12-08

TOWN of NEWBURGH, INDIANA

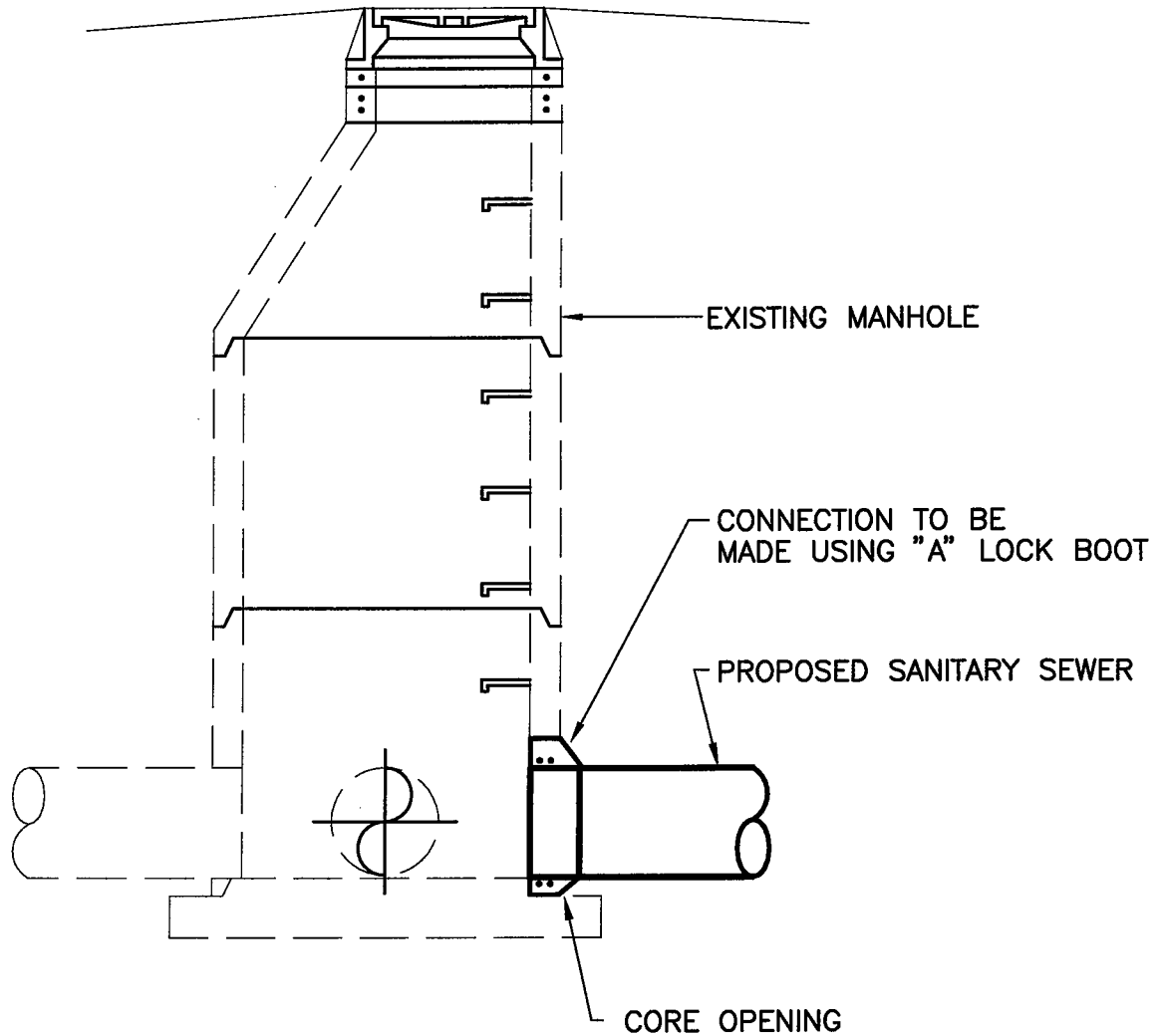
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A1.4



GAP BETWEEN FACE OF CONC. BASE AND PIPE SHALL NOT EXCEED 1"

TYPICAL EXISTING MANHOLE ENTRY DETAIL

NO.	REVISION	DATE
1	ADD 2" GAP NOTE	08-22-07

TOWN of NEWBURGH, INDIANA

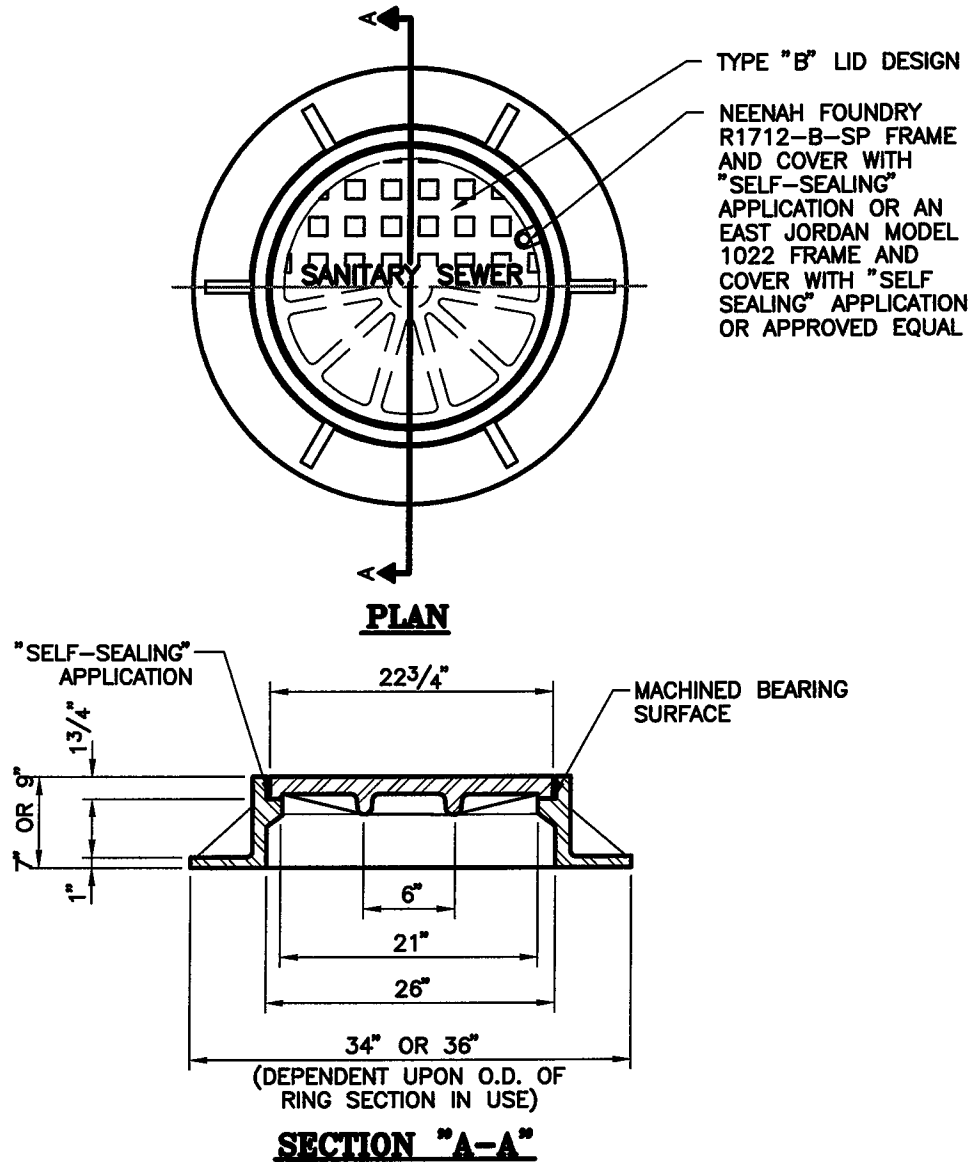
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A1.5



SANITARY SEWER MANHOLE FRAME AND COVER

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

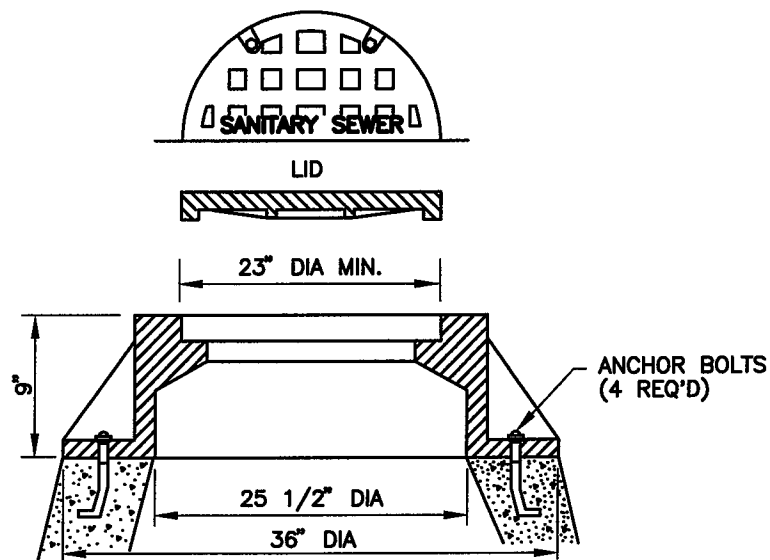
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APPROVED _____ DATE _____

FIGURE

A1.6

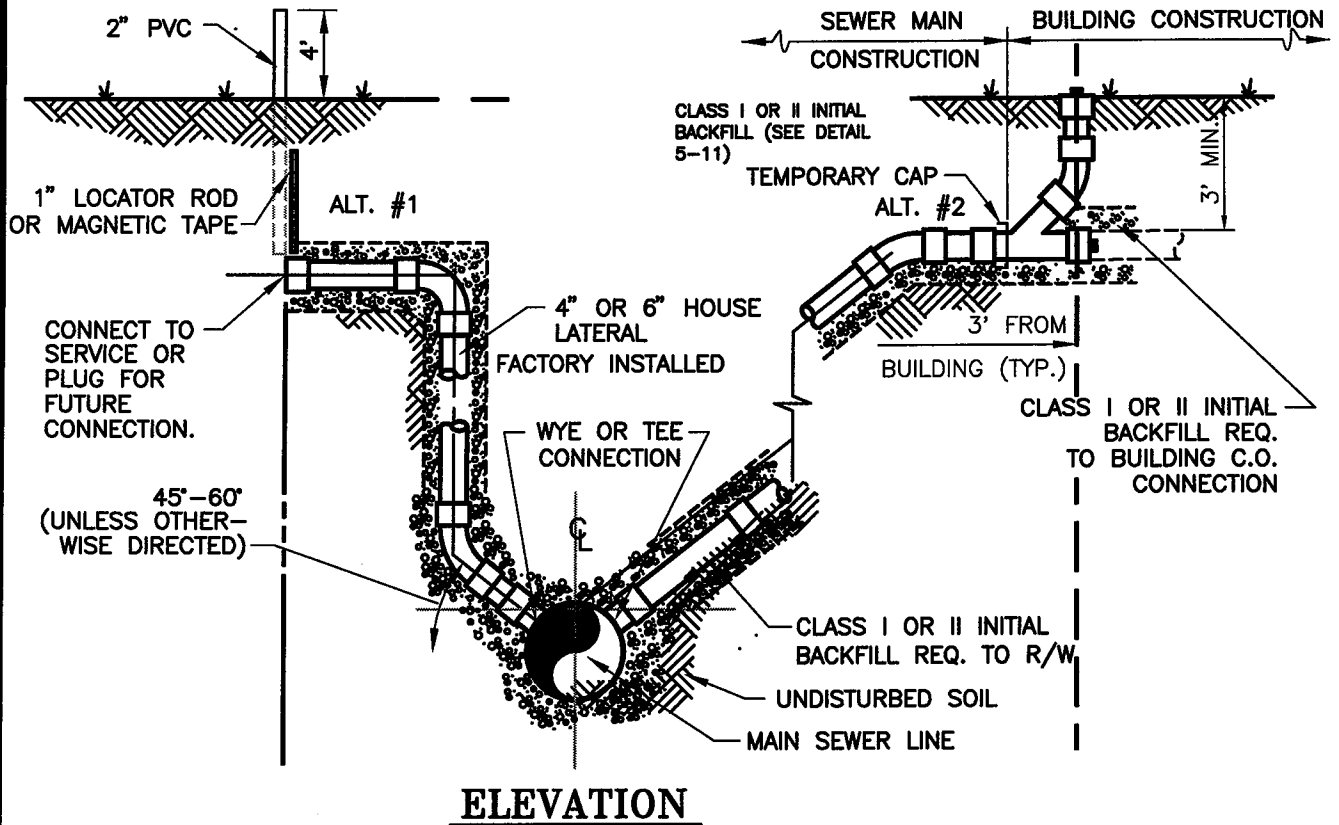
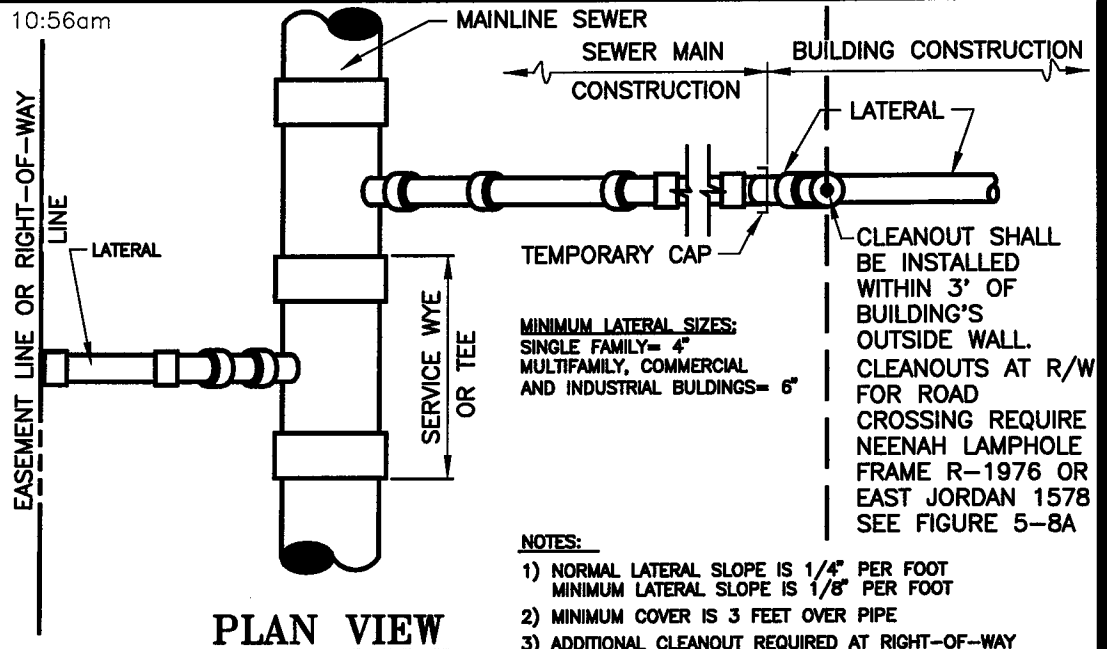


NEENAH FOUNDRY CO., R-1916-C w/GASKET SEAL AND BOLTED LID. CONCEALED PICKHOLES.
 JOHN BOUCHARD & SONS COMPANY, NASHVILLE, TENNESSEE OR AN EAST JORDAN MODEL 1022
 FRAME AND 1022 WT COVER WITH GASKET SEAL AND BOLTED LID. CONCEALED PICKHOLES OR
 APPROVED EQUAL. WEIGHT OF FRAME AND COVER TO BE 300 LBS. (MINIMUM).

ELEVATION

WATERPROOF SANITARY MANHOLE FRAME AND BOLTED LID

NO.	REVISION	DATE	TOWN of NEWBURGH, INDIANA		FIGURE
					A1.7
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	



SERVICE CONNECTION FOR SHALLOW SEWERS (ALT.#1 & ALT.#2)

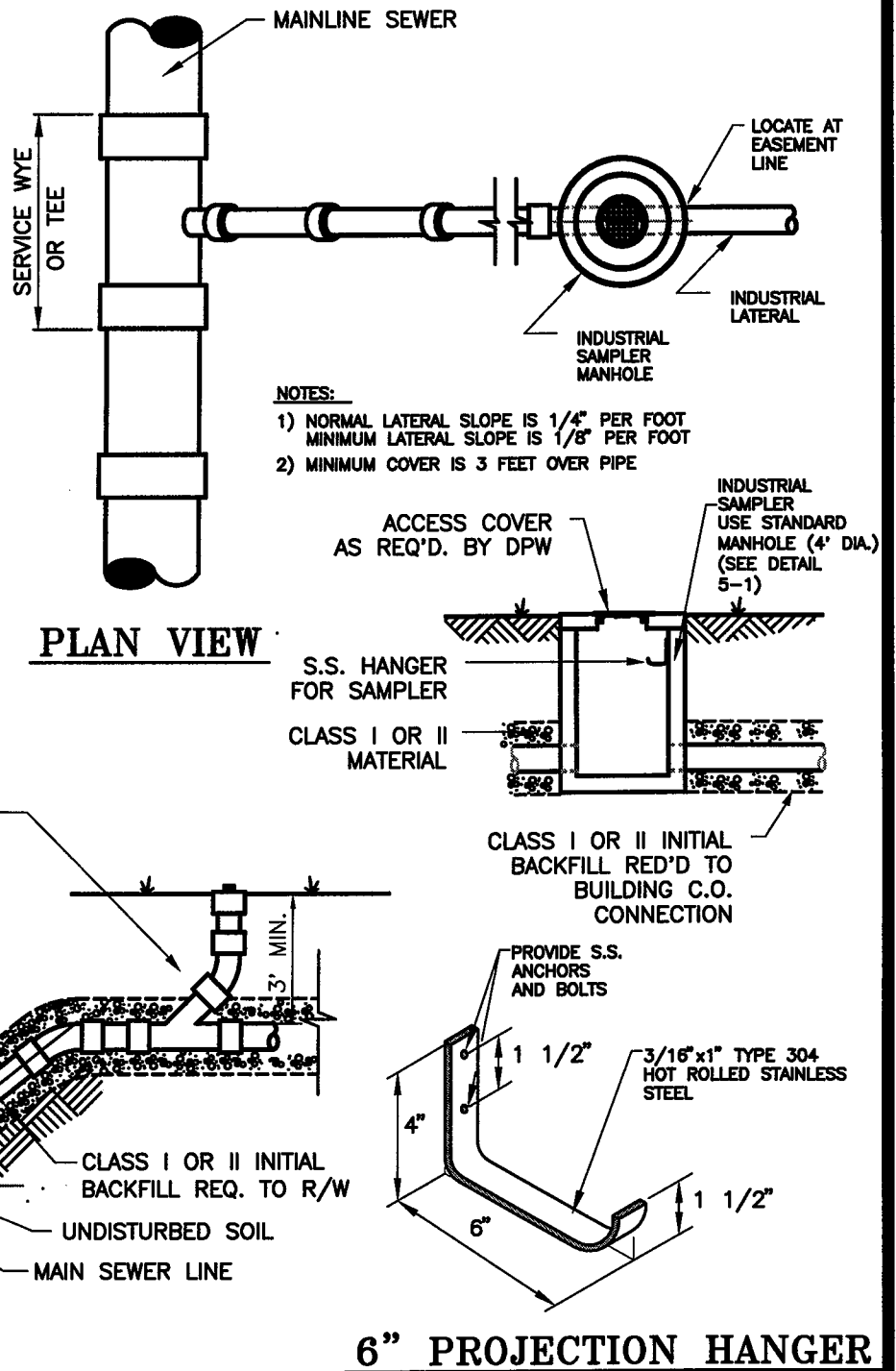
NO.	REVISION	DATE
1	ADD CLEANOUT	01-08-03
2	LATERAL SIZE	01-08-03
3	CLEANOUTS	03-04-03
4	ADD TEMP. CAP AND CONST. INFO.	08-23-07

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

A2.1



INDUSTRIAL SEWER SERVICE CONNECTION

NO.	REVISION	DATE
1	C.O. & HANGER	03-04-03

TOWN of NEWBURGH, INDIANA

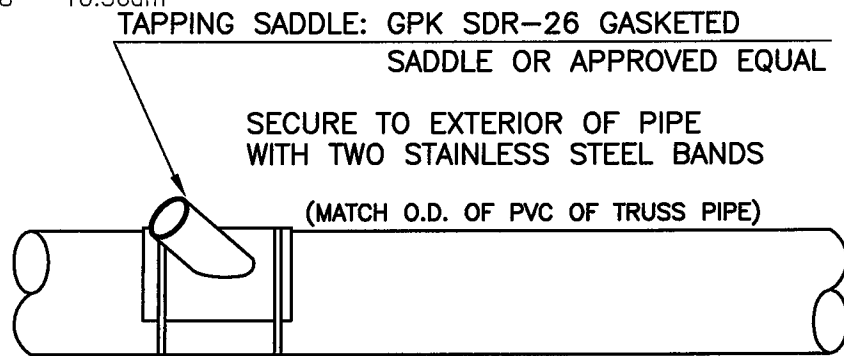
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APPROVED _____ DATE _____

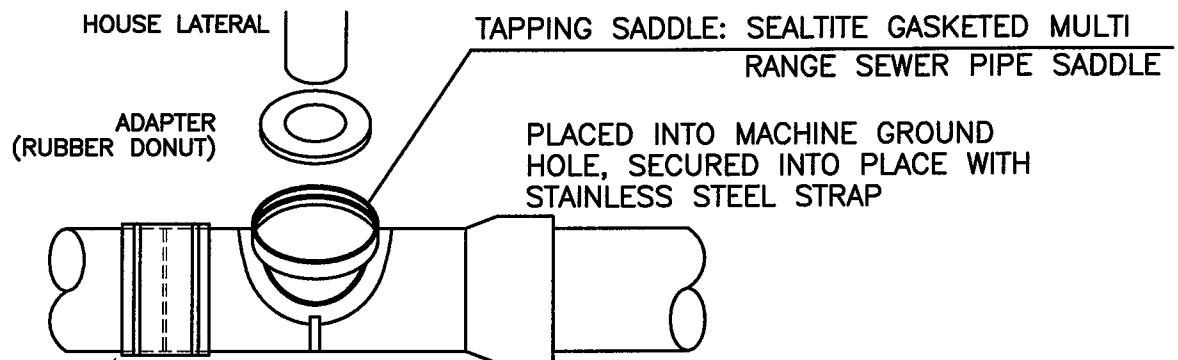
APPROVED _____ DATE _____

FIGURE

A2.2



PVC - TRUSS PIPE TAP



CLAY PIPE TAP

IF THE CLAY MAINLINE SEWER IS BROKEN THE DAMAGED SECTION SHALL BE REMOVED AND A REPLACEMENT SECTION INSERTED USING A HYMAX SOLID SLEEVE CONNECTOR.

GENERAL NOTES:

USE OF HAMMER AND CHISEL TO CUT SADDLE TAPPING HOLE IN CLAY PIPE IS NOT ACCEPTABLE.

USE OF CONCRETE GROUT IN PLACE OF THE ABOVE SHOWN TAPPING SADDLES IS NOT ACCEPTABLE.

1. PLASTIC LINES: A GPK SDR 26 GASKETED SADDLE FOR PLASTIC SEWER LINES THAT CAN BE SECURED WITH TWO STAINLESS STEEL BANDS OVER A VERY NEATLY CUT HOLE IN THE MAIN LINE AS SHOWN ABOVE
2. CLAY AND CONCRETE LINES: A SEALTITE TAPPING SADDLE CAN BE TAPPED IN A SEWER LINE AS SHOWN ABOVE

LATERAL CONNECTION INTO EXISTING SEWER

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

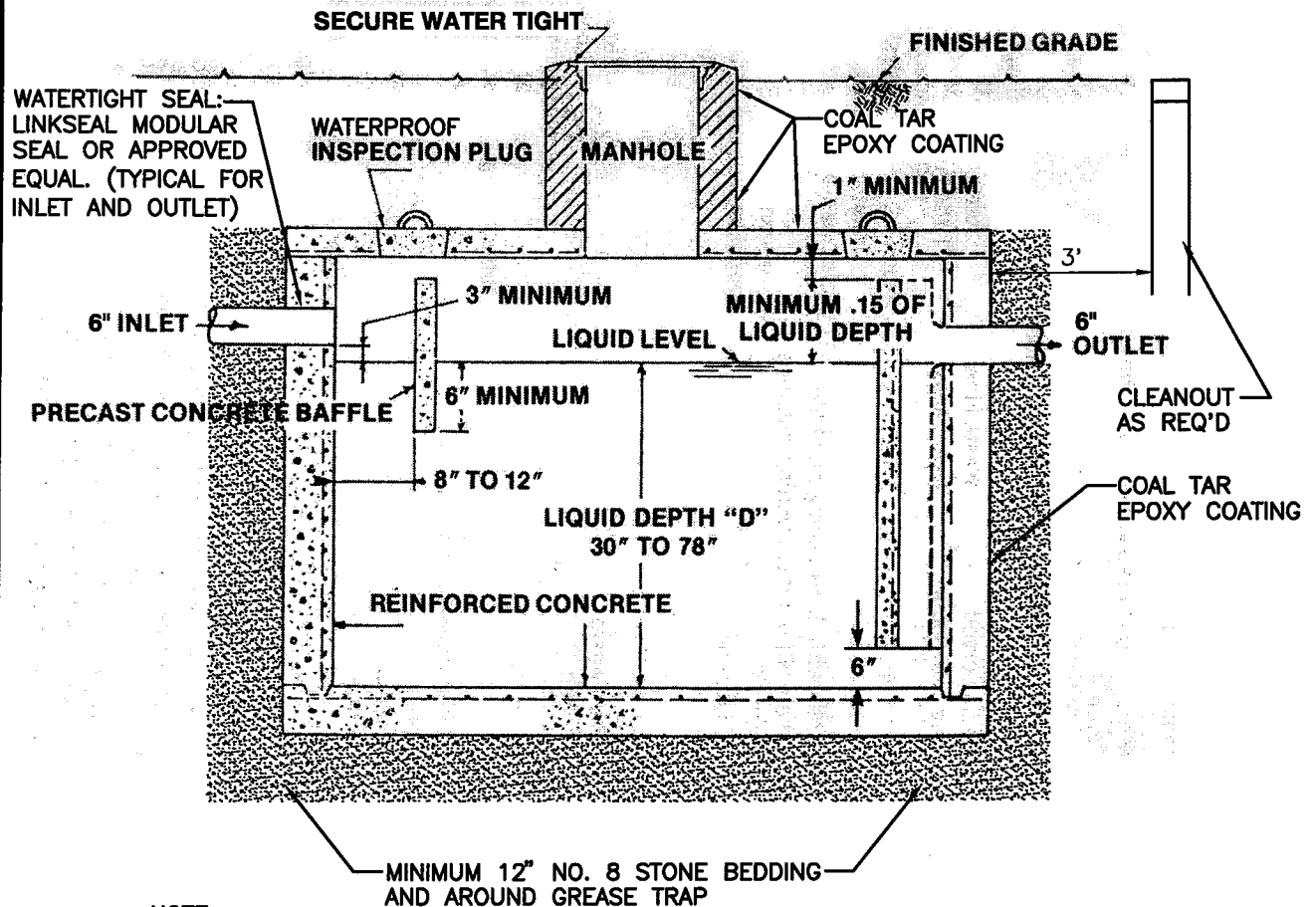
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APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A2.3



NOTE:

1. ALL BURIED EXTERIOR TANK SURFACES SHALL BE COATED WITH 10 MIL. THICKNESS COAL TAR EPOXY.
2. ALL LATERAL PIPING SHALL BE GASKETED, SDR 26 PVC.
3. ALL TANK JOINTS SHALL BE PROVIDED WITH WATERTIGHT SEALS.
4. THE MINIMUM SET BACK FROM THE BOTTOM OF THE BUILDING FOUNDATION TO THE BOTTOM OF THE GREASE TRAP EXCAVATION SHALL BE 1:1.
5. THE LENGTH TO WIDTH RATIO FOR THE TANK SHALL BE 2:1.

TYPICAL GREASE TRAP

NO.	REVISION	DATE
1	WATER TIGHT	03-10-06
2	WATERPROOF	07-26-07
3	LATERAL PIPE NOTE	02-11-08
4	6" INLET & OUTLET	02-11-08

TOWN of NEWBURGH, INDIANA

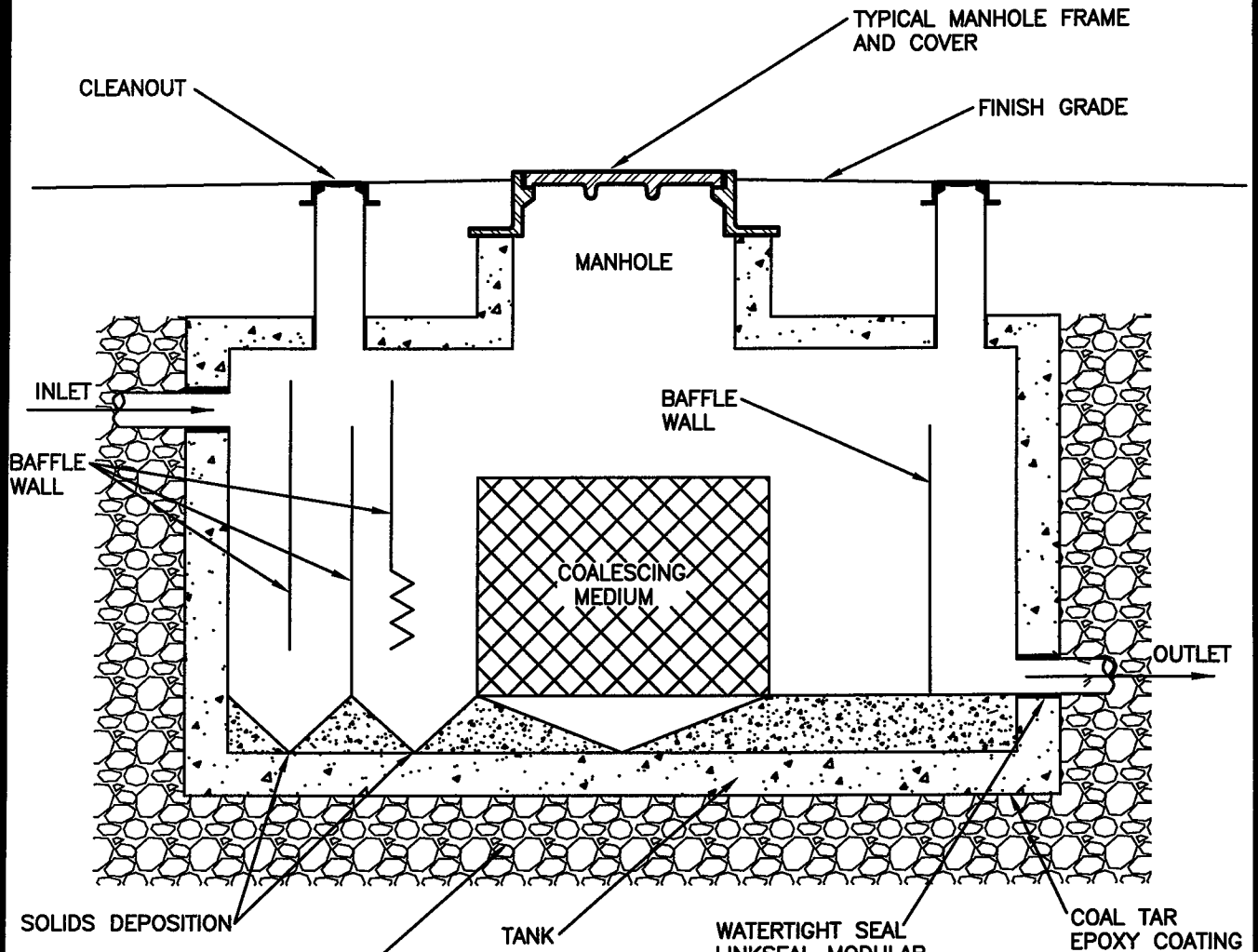
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A2.4



NOTE:

1. ALL BURIED EXTERIOR TANK SURFACES SHALL BE COATED WITH 10 MIL. THICKNESS COAL TAR EPOXY.
2. ALL LATERAL PIPING SHALL BE GASKETED, SDR 26 PVC.
3. ALL TANK JOINTS SHALL BE PROVIDED WITH WATERTIGHT SEALS.
4. THE MINIMUM SET BACK FROM THE BOTTOM OF THE BUILDING FOUNDATION TO THE BOTTOM OF THE GREASE TRAP EXCAVATION SHALL BE 1:1.
5. THE LENGTH TO WIDTH RATIO FOR THE TANK SHALL BE 2:1

TYPICAL OIL/WATER SEPARATOR

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

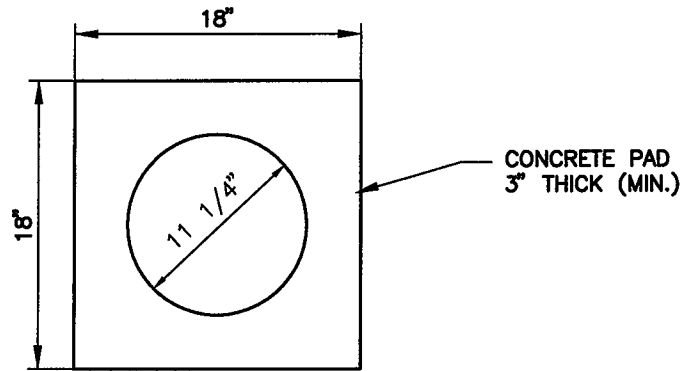
APPROVED _____ DATE _____

APPROVED _____ DATE _____

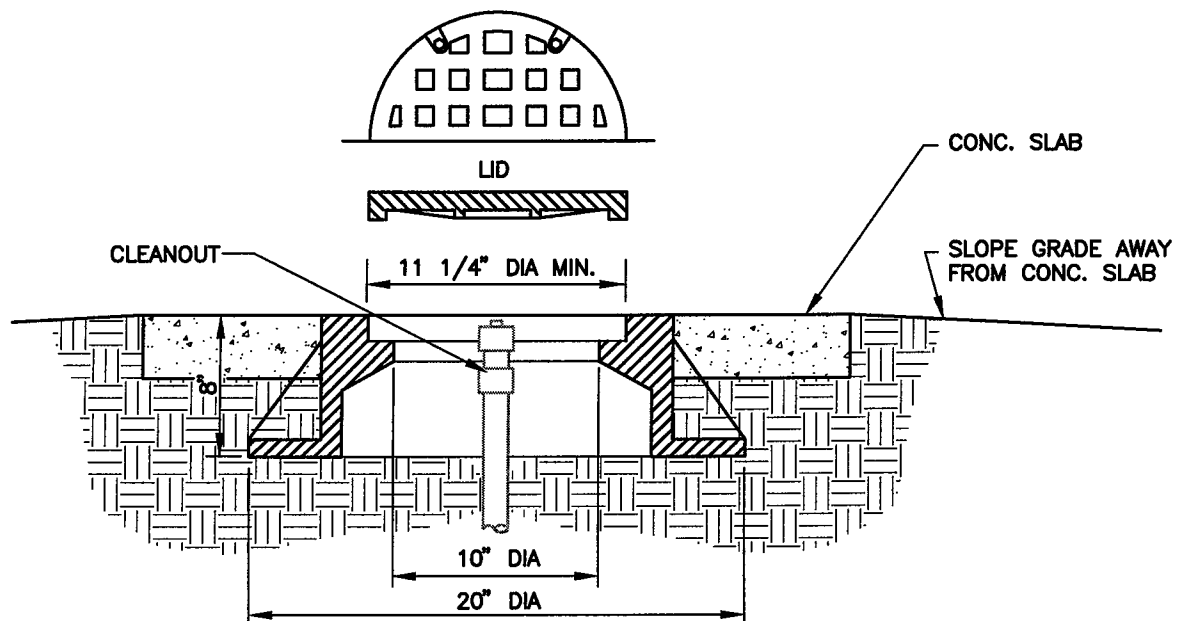
APPROVED _____ DATE _____

FIGURE

A2.5



CONC. PAD FOR LAMPOLE FRAME



NEENAH FOUNDRY CO., R-1976 LAMPHOLE FRAME, SOLID LID.
OR EAST JORDAN 1578

FRAME SECTION

LAMPHOLE FRAME FOR CLEANOUTS FRAME AND SOLID LID

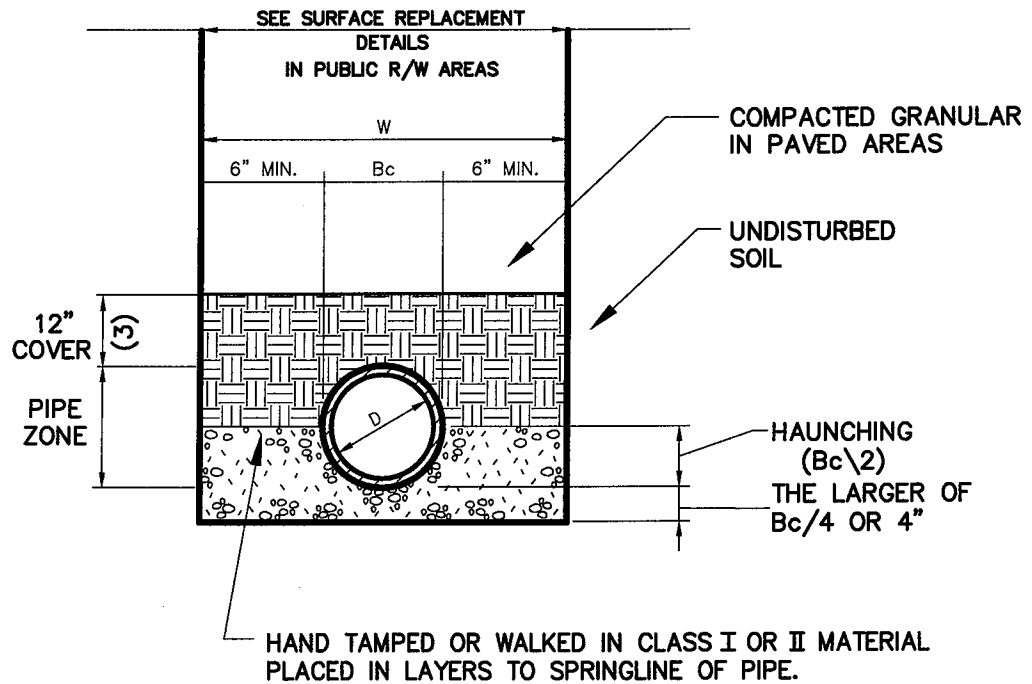
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

A2.6



W = MAXIMUM ALLOWABLE TRENCH WIDTH FOR PIPE AS PER ASTM NOT TO EXCEED FOUR (4) FEET FOR 6" THROUGH 24" PIPE NOR SIX (6) FEET FOR 27" THROUGH 48" PIPE

D = PIPE DIAMETER (INTERNAL)

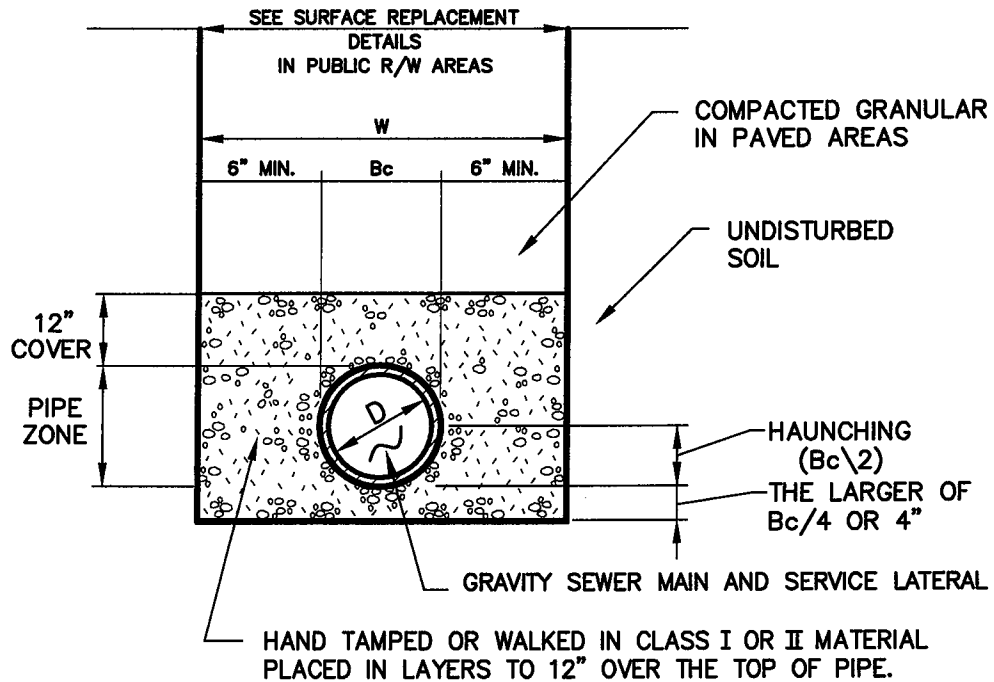
Bc = PIPE DIAMETER (EXTERNAL)

NOTES:

1. BEDDING STOPS AT SPRINGLINE OF THE PIPE. BACKFILLING ABOVE THIS POINT SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
2. WORK FALLING UNDER THE JURISDICTION OF THE INDIANA DEPARTMENT OF TRANSPORTATION SHALL UTILIZE COMPACTED GRANULAR BACKFILL MATERIAL FOR INITIAL AND FINAL BACKFILL ANYWHERE WITHIN 12 FEET OF THE EDGE OF PAVEMENT. OTHERWISE, COMPACTED GRANULAR BACKFILL MATERIAL SHALL ONLY BE USED UNDER PAVEMENT SURFACES OR OTHER SPECIFICALLY DESIGNATED AREAS.
3. GRANULAR FILL IN PAVED AREAS

**FIRST CLASS PIPE LAYING METHOD FOR:
RIGID CONDUITS (RCP & D.I.)**

NO.	REVISION	DATE	TOWN of NEWBURGH, INDIANA	FIGURE
				A3.1
			APPROVED _____	DATE _____
			APPROVED _____	DATE _____
			APPROVED _____	DATE _____



W = MAXIMUM ALLOWABLE TRENCH WIDTH FOR PIPE AS PER ASTM
 NOT TO EXCEED FOUR (4) FEET FOR 6" THROUGH 24" PIPE
 NOR SIX (6) FEET FOR 27" THROUGH 48" PIPE
 D = PIPE DIAMETER (INTERNAL)
 Bc = PIPE DIAMETER (EXTERNAL)

NOTES:

1. BEDDING STOPS AT A POINT 12" ABOVE THE TOP OF THE PIPE. BACKFILLING ABOVE THIS POINT SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
2. WORK FALLING UNDER THE JURISDICTION OF THE INDIANA DEPARTMENT OF TRANSPORTATION SHALL UTILIZE COMPACTED GRANULAR BACKFILL MATERIAL FOR INITIAL AND FINAL BACKFILL ANYWHERE WITHIN 12 FEET OF THE EDGE OF PAVEMENT. OTHERWISE, COMPACTED GRANULAR BACKFILL MATERIAL SHALL ONLY BE USED UNDER PAVEMENT SURFACES OR OTHER SPECIFICALLY DESIGNATED AREAS.

FIRST CLASS PIPE LAYING METHOD FOR FLEXIBLE CONDUITS (PVC, CMP, RPVC, ABS & HDPE)

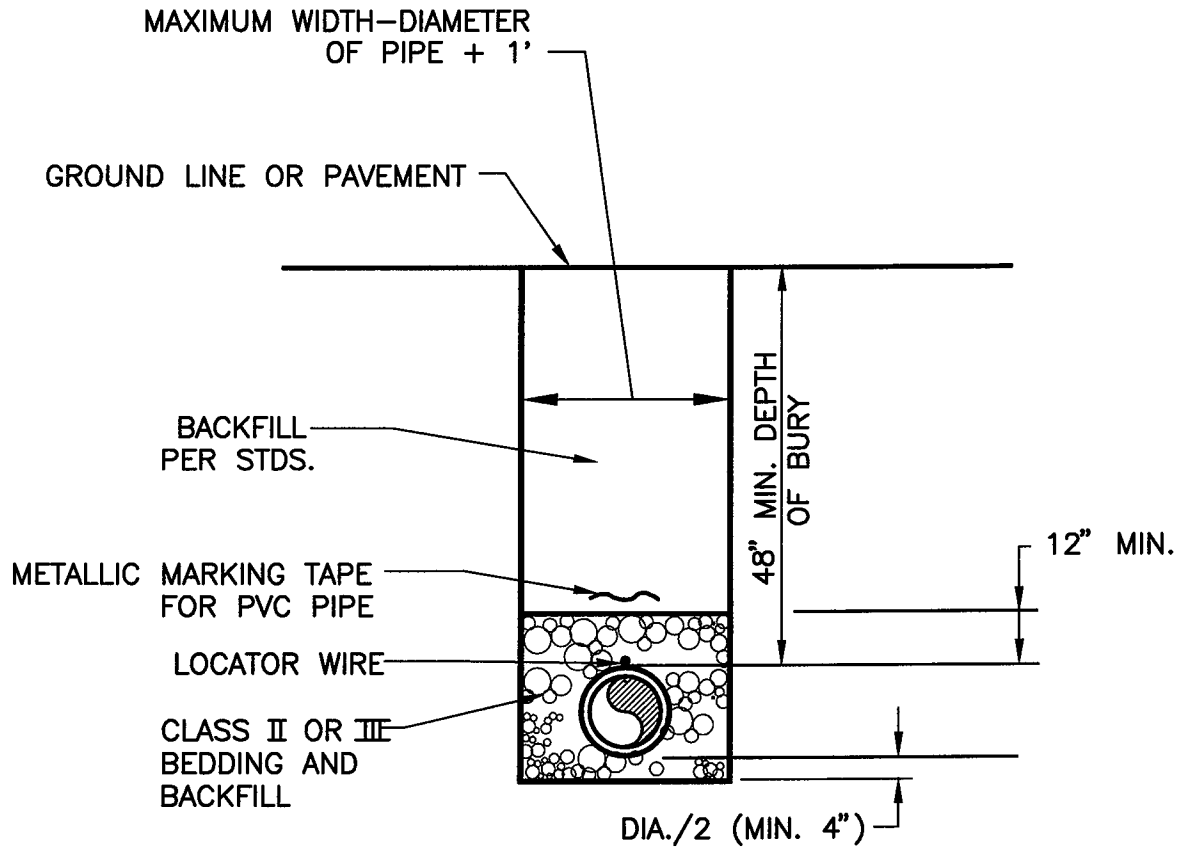
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

A3.2



PVC FORCE MAIN PIPE TRENCH DETAIL

NO.	REVISION	DATE
1	LOCATE WIRE	12-17-02

TOWN of NEWBURGH, INDIANA

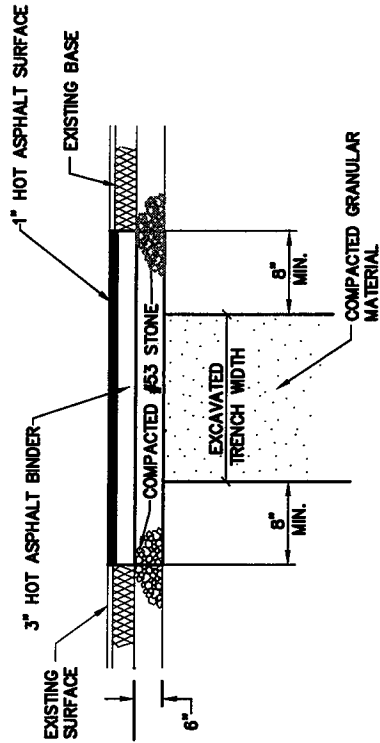
APPROVED _____ DATE _____

APPROVED _____ DATE _____

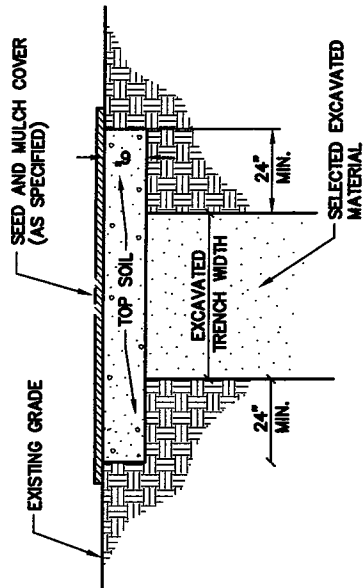
APPROVED _____ DATE _____

FIGURE

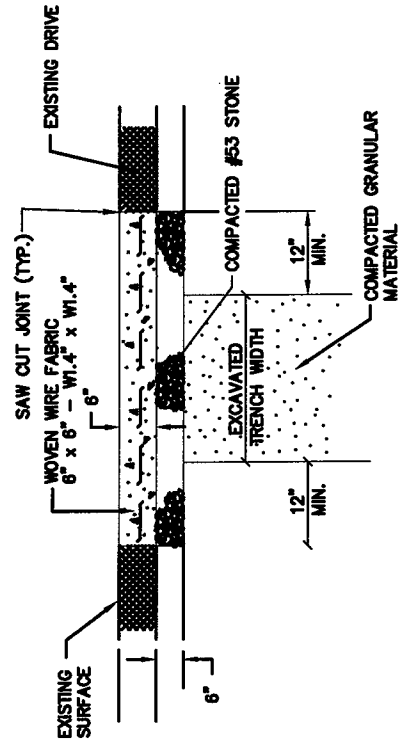
A3.3



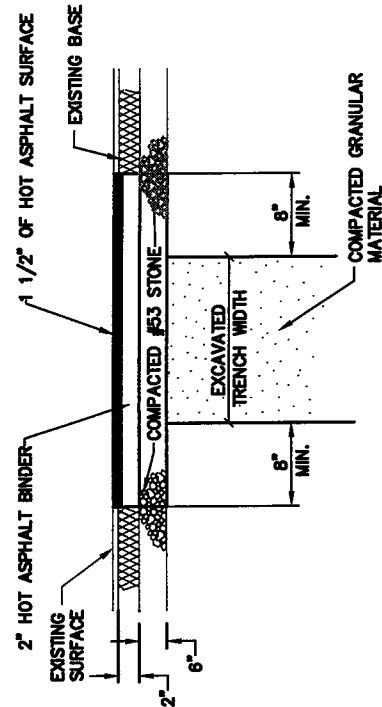
ASPHALT ROADWAY



GRASSED AREA



CONCRETE ROAD AND DRIVE



ASPHALT DRIVE

SURFACE RESTORATION DETAIL

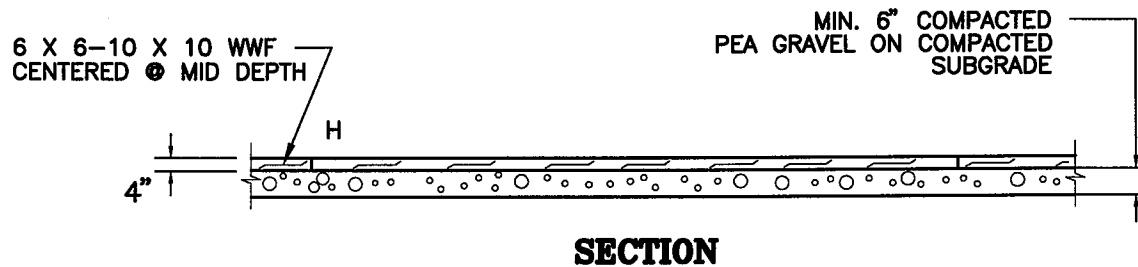
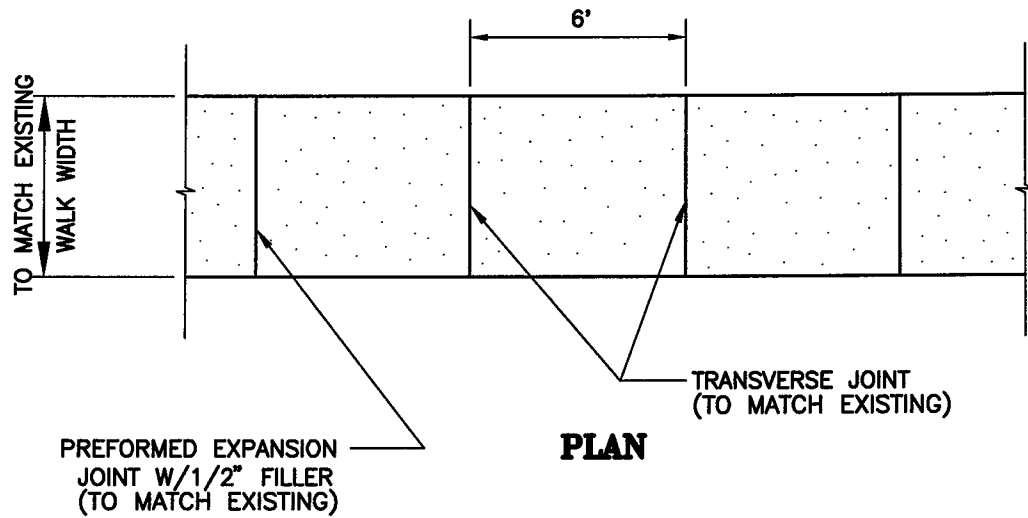
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

A4.1

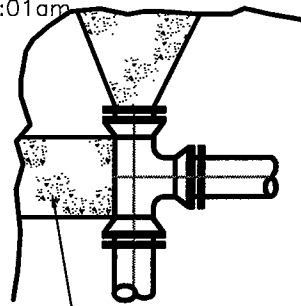


NOTE:

1. TRANSVERSE JOINTS SHALL BE CUT WITH A JOINTER HAVING A RADIUS OF 1/4" AT SPACING AS INDICATED OR AS DIRECTED BY THE ENGINEER.
2. SIDEWALK SHALL BE 6" THICK AT ALL DRIVEWAY CROSSINGS.

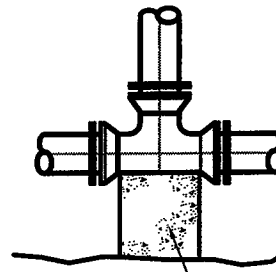
SIDEWALK RESTORATION DETAIL

NO.	REVISION	DATE	TOWN of NEWBURGH, INDIANA		FIGURE
			APPROVED _____	DATE _____	A4.2
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	



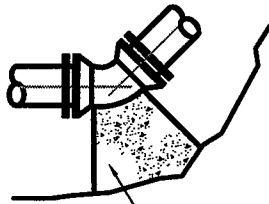
FORMED CONCRETE
BLOCKING

DETAIL A



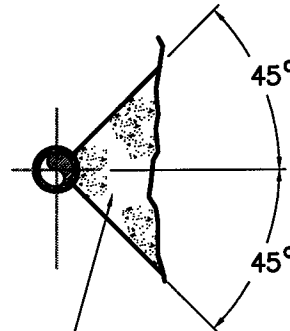
FORMED CONCRETE
BLOCKING

DETAIL B



FORMED CONCRETE
BLOCKING

DETAIL C



FORMED CONCRETE
BLOCKING

DETAIL D

AREA IN SQUARE FEET REQUIRED FOR CONCRETE THRUST BLOCKING					
SIZE	TEE & PLUG	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
4"	2.0	2.5	1.5	1.0	1.0
6"	4.0	5.5	3.0	1.5	1.0
8"	6.5	9.0	5.0	2.5	1.5
10"	10.0	14.0	7.5	4.0	2.0
12"	14.0	20.0	11.0	5.5	3.0

NOTES:

- THRUST BLOCK AREAS ARE BASED ON A SOIL BEARING LOAD OF 2,000 lb./SQ. FT.
- GREASE ALL PIPE SURFACES OR WRAP WITH POLYETHYLENE SHEETS PRIOR TO PLACEMENT OF CONCRETE
- THE REQUIREMENT FOR A THRUST BLOCK MAY BE WAIVED IF MEGALUG RESTRAINED JOINT FITTINGS ARE USED WITH THE PIPE

THRUST BLOCKING DETAILS FOR PRESSURE MAIN

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

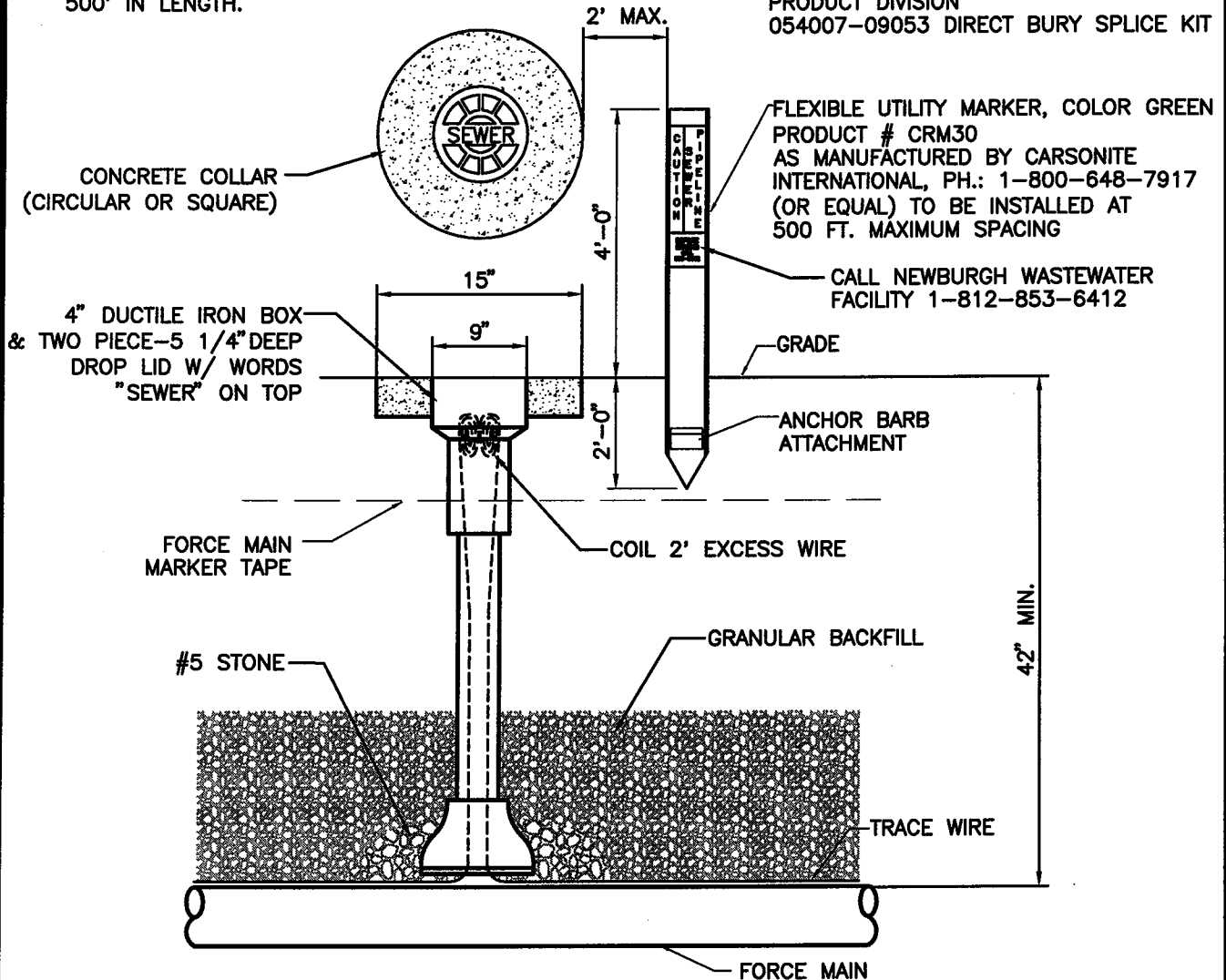
APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

A5.1

NOTE: MARKERS & RISERS SHALL BE INSTALLED AT LIFT STATIONS & DISCHARGE MANHOLE LOCATIONS. MARKERS & RISERS SHALL BE INSTALLED ALONG THE FORCE MAIN ROUTE AT 500' INTERVALS FOR FORCE MAIN OVER 500' IN LENGTH.

TRACER WIRE SHALL BE No. 12 TW, THW, THHW, COPPER WIRE ALL UNDER GROUND SPLICES IN TRACER WIRE SHALL BE CONNECTED WITH A 3M ELECTRICAL PRODUCT DIVISION 054007-09053 DIRECT BURY SPLICE KIT



FORCE MAIN MARKING DETAIL

NO.	REVISION	DATE
1	ORIGINAL RELEASE	5/4/99
2	NEW DETAIL	3/10/06

TOWN of NEWBURGH, INDIANA

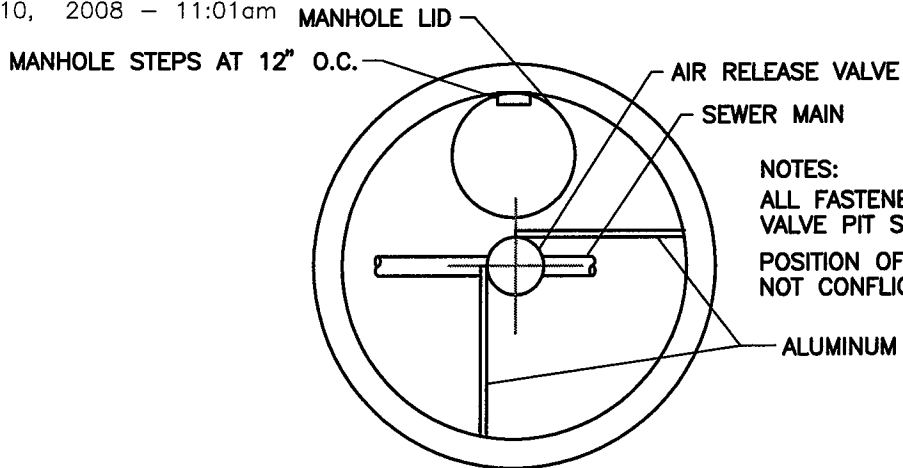
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

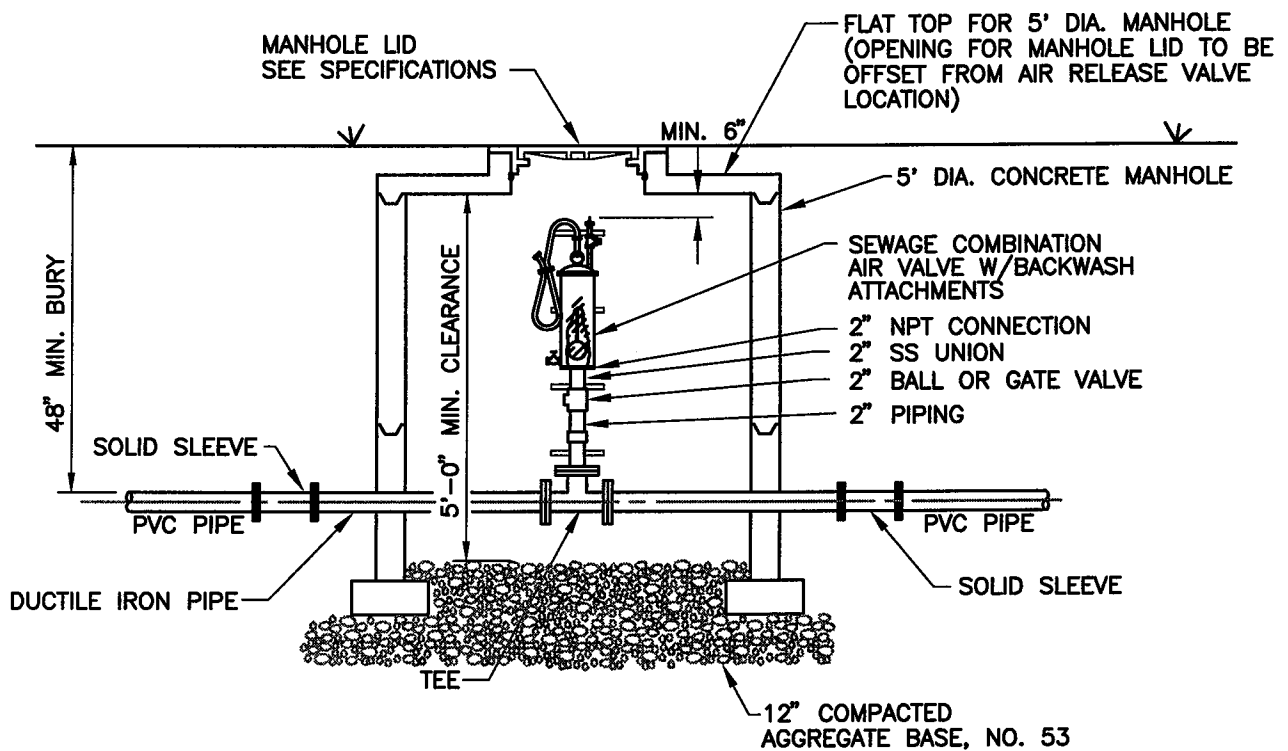
FIGURE

A5.2



NOTES:
ALL FASTENERS USED IN AIR RELEASE VALVE PIT SHALL BE STAINLESS STEEL.
POSITION OF AIR RELEASE VALVE SHALL NOT CONFLICT WITH MANHOLE ACCESS.
ALUMINUM OR S.S. ANGLE SUPPORTS

PLAN



NOTES:
PIPING FROM TEE TO AIR RELEASE VALVE SHALL BE STAINLESS STEEL.
MANHOLE STEPS SHALL BE PROVIDED AT 12\"/>

SECTION

AIR RELEASE VALVE

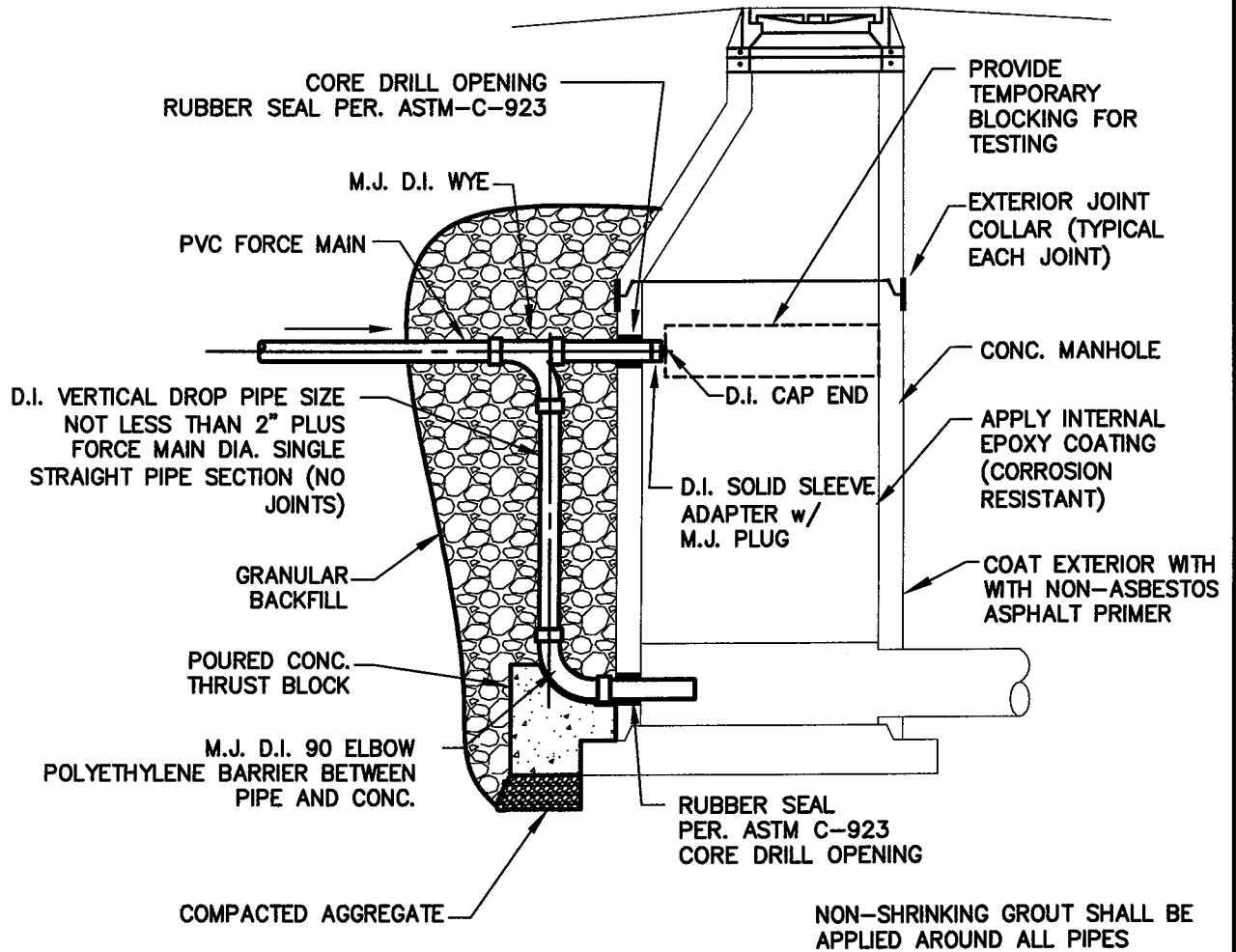
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
APPROVED _____ DATE _____
APPROVED _____ DATE _____

FIGURE

A5.3



NOTE: GAP BETWEEN FACE OF CONC. BASE AND PIPE SHALL NOT EXCEED 2"

STANDARD EXTERNAL FORCE MAIN DROP INTO SANITARY MANHOLE

NO.	REVISION	DATE
1.	DROP ASSEMBLY	01-24-07
2.	ADD 2" GAP NOTE AND D.I. PIPING	06-23-07

TOWN of NEWBURGH, INDIANA

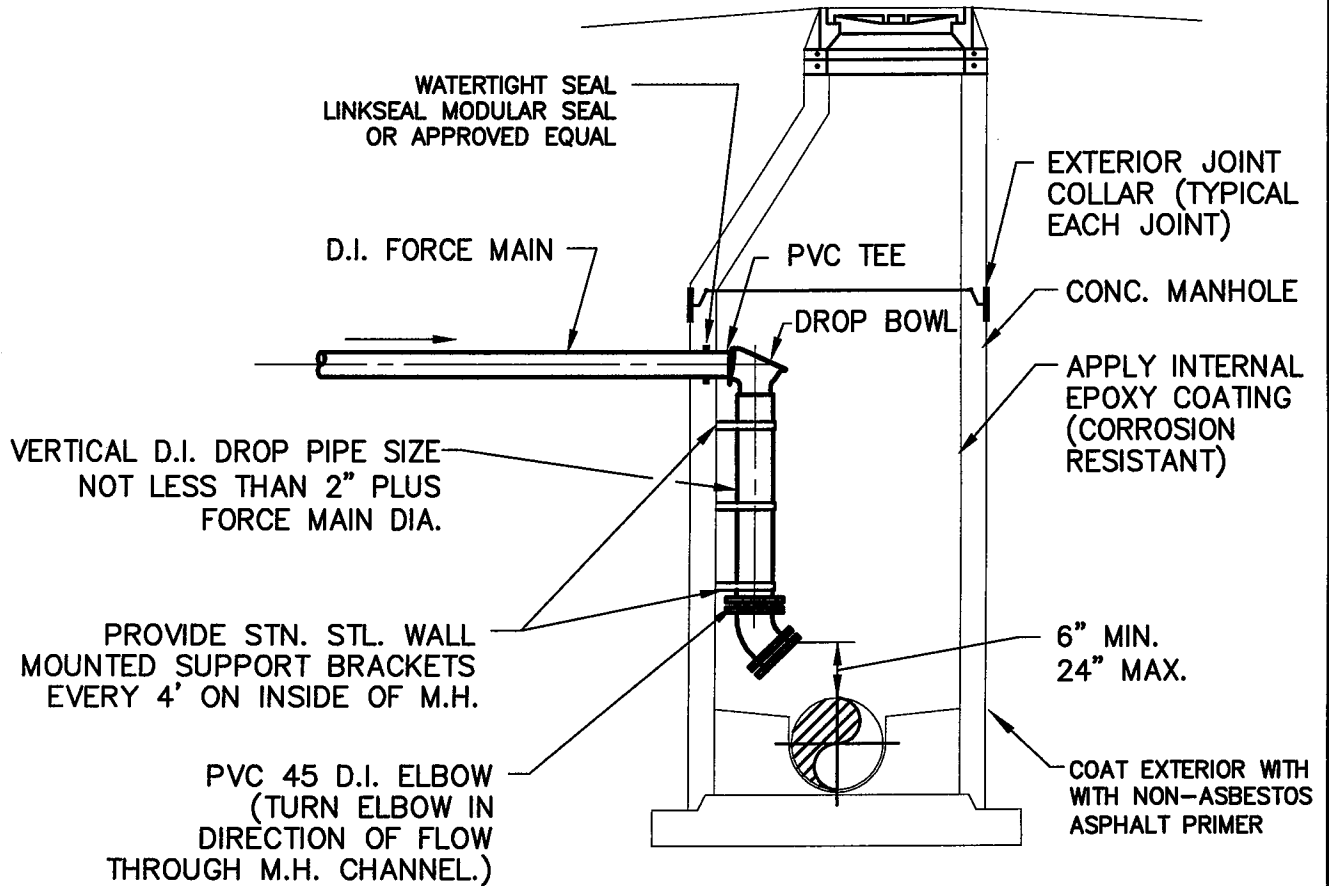
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A5.4



STANDARD INTERNAL FORCE MAIN DROP INTO SANITARY MANHOLE (ONLY WITH SPECIAL APPROVAL FROM UTILITY)

NO.	REVISION	DATE
1	EXT. CHIMNEY	02-20-02
2	DELETE 1	12-10-02
3	EPOXY	12-17-02
4	EDIT DROP TO D.I. REMOVE GROUT	08-23-07
5	ADD SPECIAL APPROVAL NOTE	08-23-07

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____

APPROVED _____ DATE _____

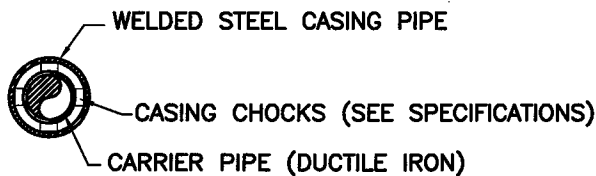
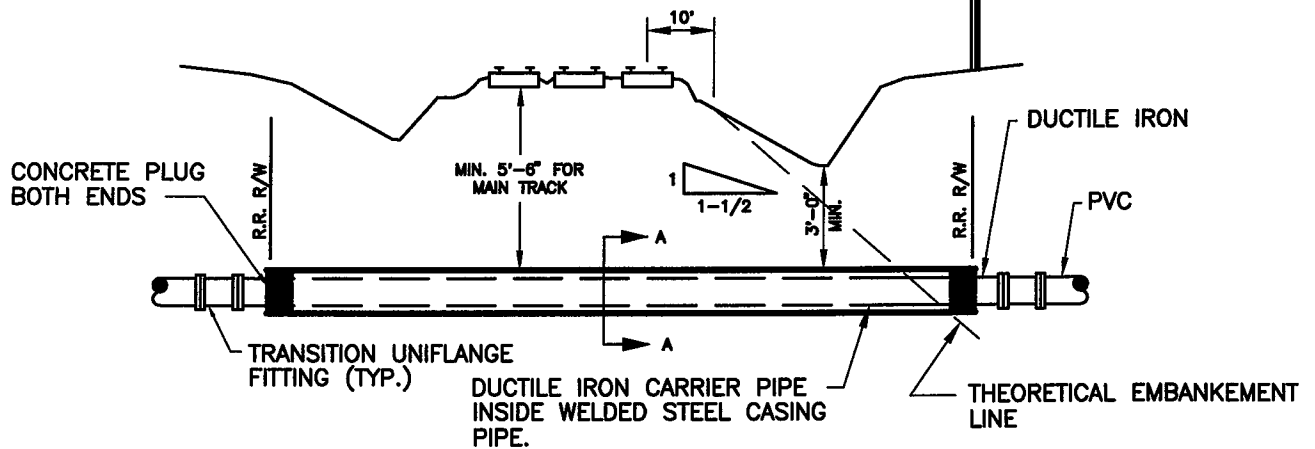
APPROVED _____ DATE _____

FIGURE

A5.5

WARNING SIGN(S) TO BE A DURABLE, WATERPROOF SIGN LOCATED OVER CENTERLINE OF PIPE AND SHOWING THE FOLLOWING INFORMATION:

1. NAME AND ADDRESS OF TOWN
2. CONTENTS OF PIPE
3. PRESSURE IN PIPE
4. DEPTH BELOW GRADE AT POINT OF SIGN
5. EMERGENCY TELEPHONE NO. IN CASE OF PIPE RUPTURE.



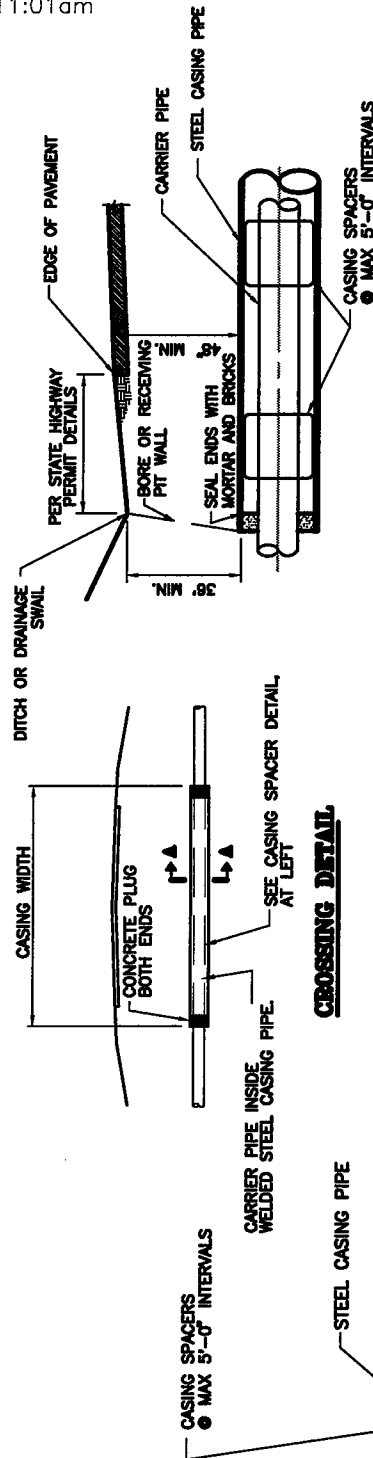
SECTION "A-A"

CASING PIPE UNDER RAILWAY TRACKS SHALL EXTEND TO THE GREATER OF THE FOLLOWING DISTANCES.

1. 2 FEET BEYOND TOE OF SLOPE
2. 3 FEET BEYOND DITCH LINE
3. A MINIMUM OF 25 FEET EACH SIDE FROM CENTER LINE OF OUTSIDE TRACK
4. DISTANCE SHOWN ON PLANS
5. ACROSS THE ENTIRE WIDTH OF THE RIGHT-OF-WAY.
6. BEYOND THE THEORETICAL EMBANKMENT LINE.

RAILROAD PIPE CROSSING DETAIL

NO.	REVISION	DATE	TOWN of NEWBURGH, INDIANA		FIGURE
					A6.1
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	



SECTION "A-A"

GENERAL NOTES:

1. SHEET AS REQUIRED FOR PUSH PIT AND RECEIVING PIT WHERE SOIL CONDITIONS WILL NOT ALLOW A SAFE WORKABLE PIT. ANY PORTION OF PIT NOT SHEETED MUST BE SLOPED FOR SAFETY OF MEN AND EQUIPMENT. PIT CONSTRUCTION SHALL COMPLY WITH ALL PROVISIONS, REQUIREMENTS AND LATEST REVISIONS OF FEDERAL AND STATE REGULATIONS.
2. ALL MATERIAL USED FOR SHEETING, WHALERS AND STRUTS MUST BE OF ADEQUATE SIZE TO SAFELY WITHSTAND EARTH PRESSURES. FOR DEEP PITS, STEEL SHEETING IS ADVISABLE.
3. PROVIDE SUMP AND WELL POINTS AS NECESSARY TO MAINTAIN DRY, SAFE PITS.
4. SEE STATE HIGHWAY PERMIT FOR SPECIFIC BORING DETAILS.
5. CASING SPACERS SHALL HAVE STAINLESS STEEL BAND AND RISERS, EPDM OR PVC LINER, AND PLASTIC RUNNERS. SPACERS SHALL BE ADVANCE PRODUCTS AND SYSTEM Inc. MODEL SSI, OR EQUAL.

STEEL CASING PIPE REQUIREMENTS		
CARRIER PIPE DIA.	CASING PIPE DIA.	CASING PIPE WALL THICKNESS
6"	16"	0.25"
8"	18"	0.25"
10"	20"	0.25"
12"	22"	0.25"
14"	24"	0.25"
15"	24"	0.25"
16"	26"	0.375"
18"	28"	0.375"
20"	30"	0.375"
21"	32"	0.375"
24"	36"	0.375"
27"	40"	0.50"
30"	42"	0.50"

CONSTRUCTION NOTE:

ANY DISTURBED AREAS WITHIN RIGHT-OF-WAY TO BE RESTORED TO SAME OR BETTER CONDITION AS PRIOR TO CONSTRUCTION.

STATE HIGHWAY BORING/CASING DETAIL

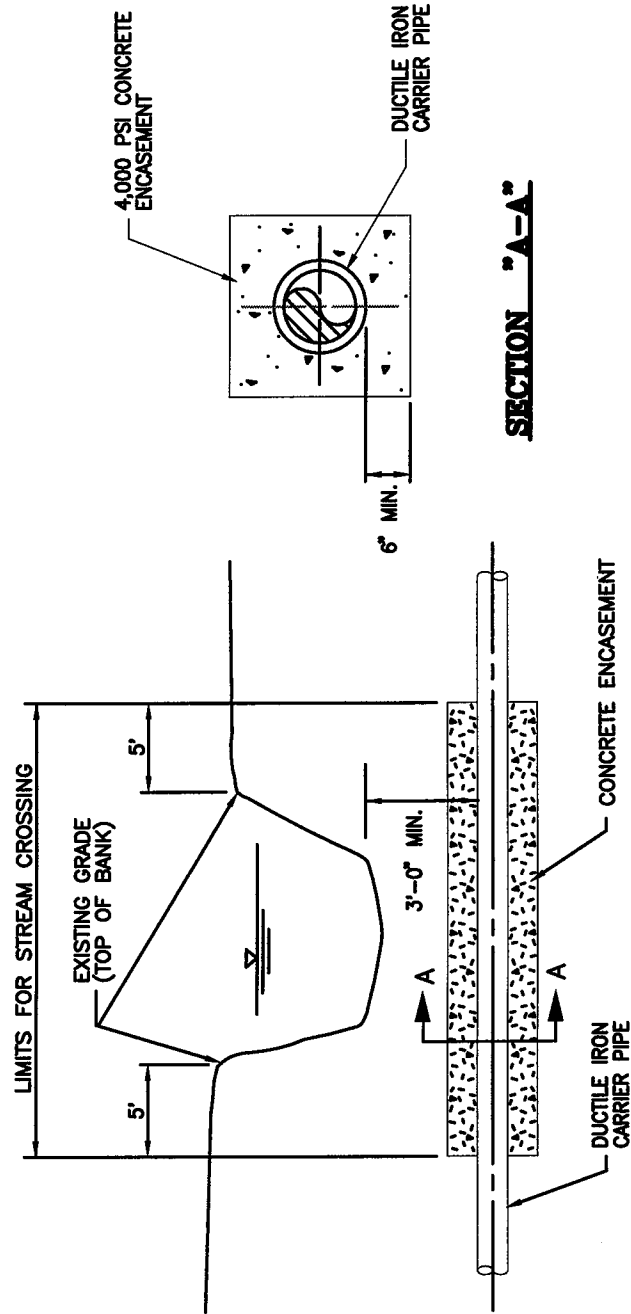
NO.	REVISION	DATE
1	CASE PIPE	12-17-02

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

A6.2



STREAM CROSSING DETAIL

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____

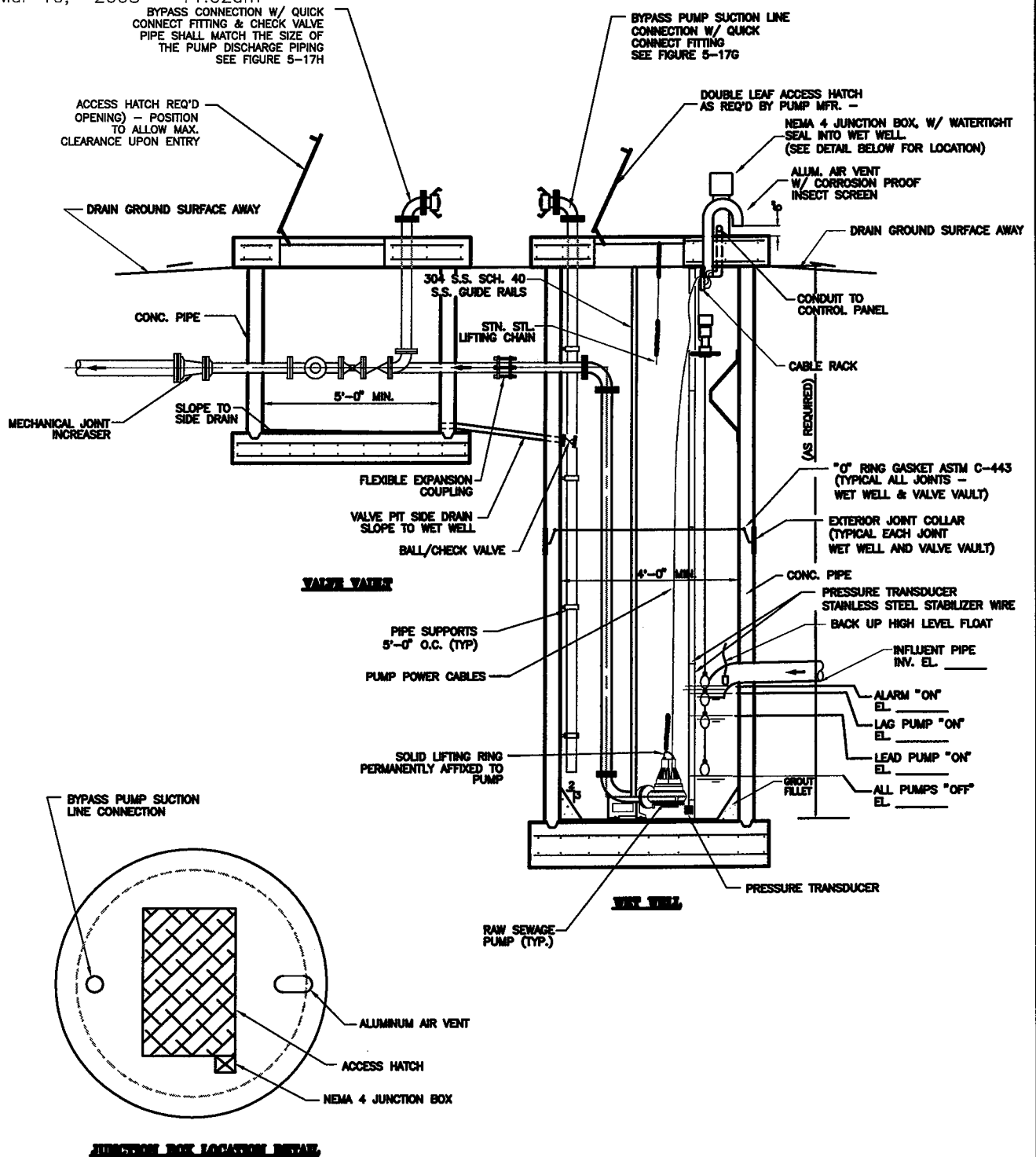
APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A6.3

Mar 10, 2008 - 11:02am



TYPICAL LIFT STATION SECTION

NO.	REVISION	DATE
1	QUICK CONNECTS	05-04-99
2	VENT, BYPASS, TRANS.	01-03
3	MOVE QUICK CONNECT OUTSIDE OF VALVE VAULT, PIPE SIZING, S.S. RAILS	02-12-08

TOWN of NEWBURGH, INDIANA

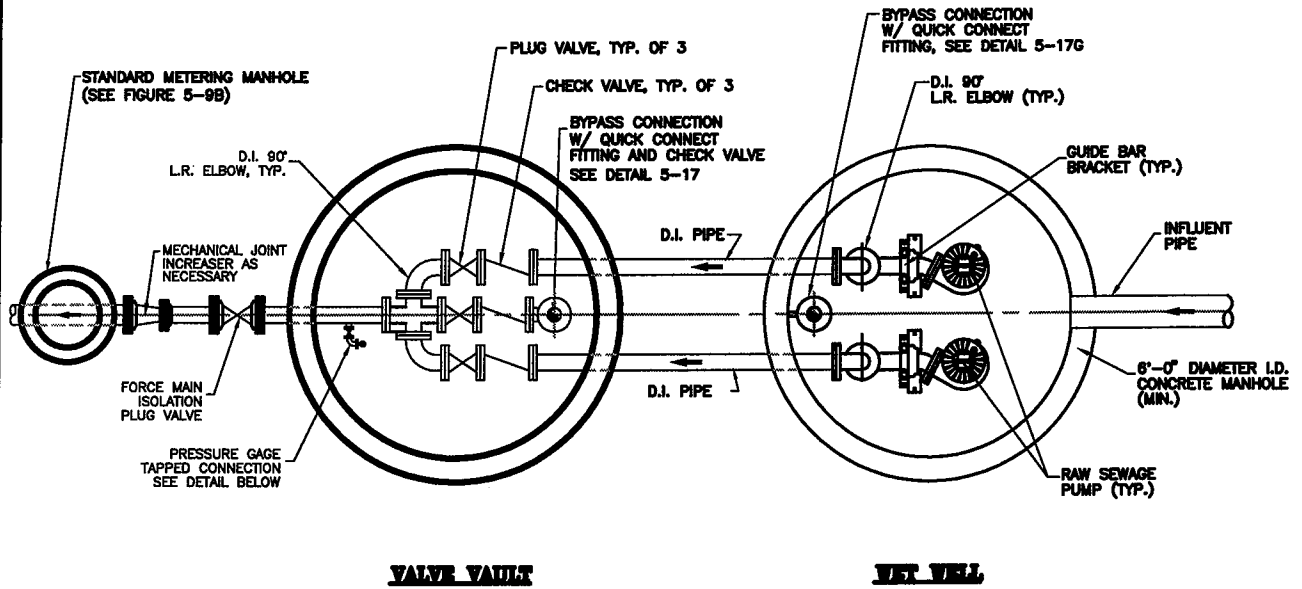
APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

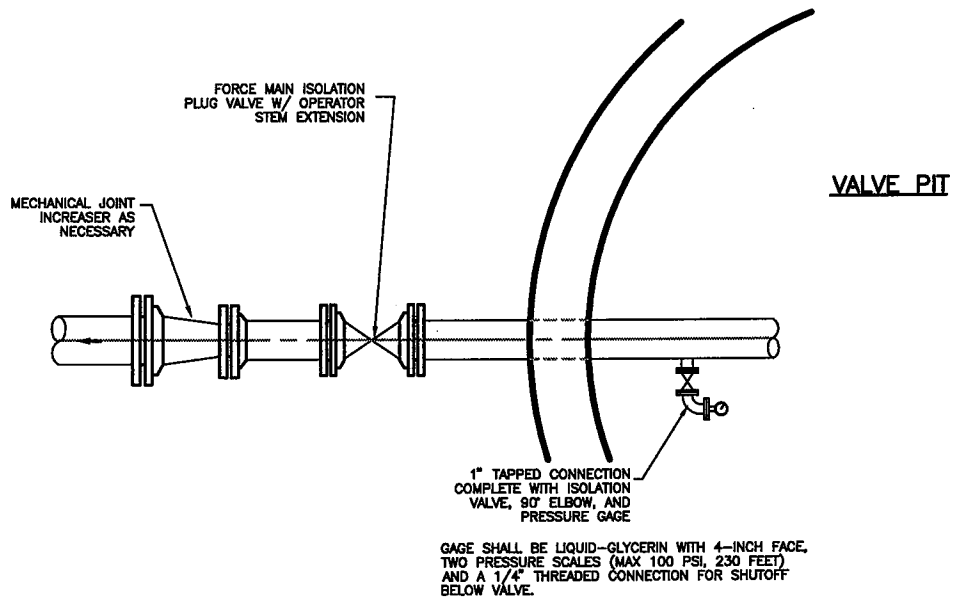
A7.1

NOTE:

PIPING AND VALVES SHALL BE SIZED TO MATCH
PUMP DISCHARGE, BUT NOT LESS THAN 4 INCHES.



TYPICAL LIFT STATION PLAN



TYPICAL PRESSURE GAGE INSTALLATION LAYOUT

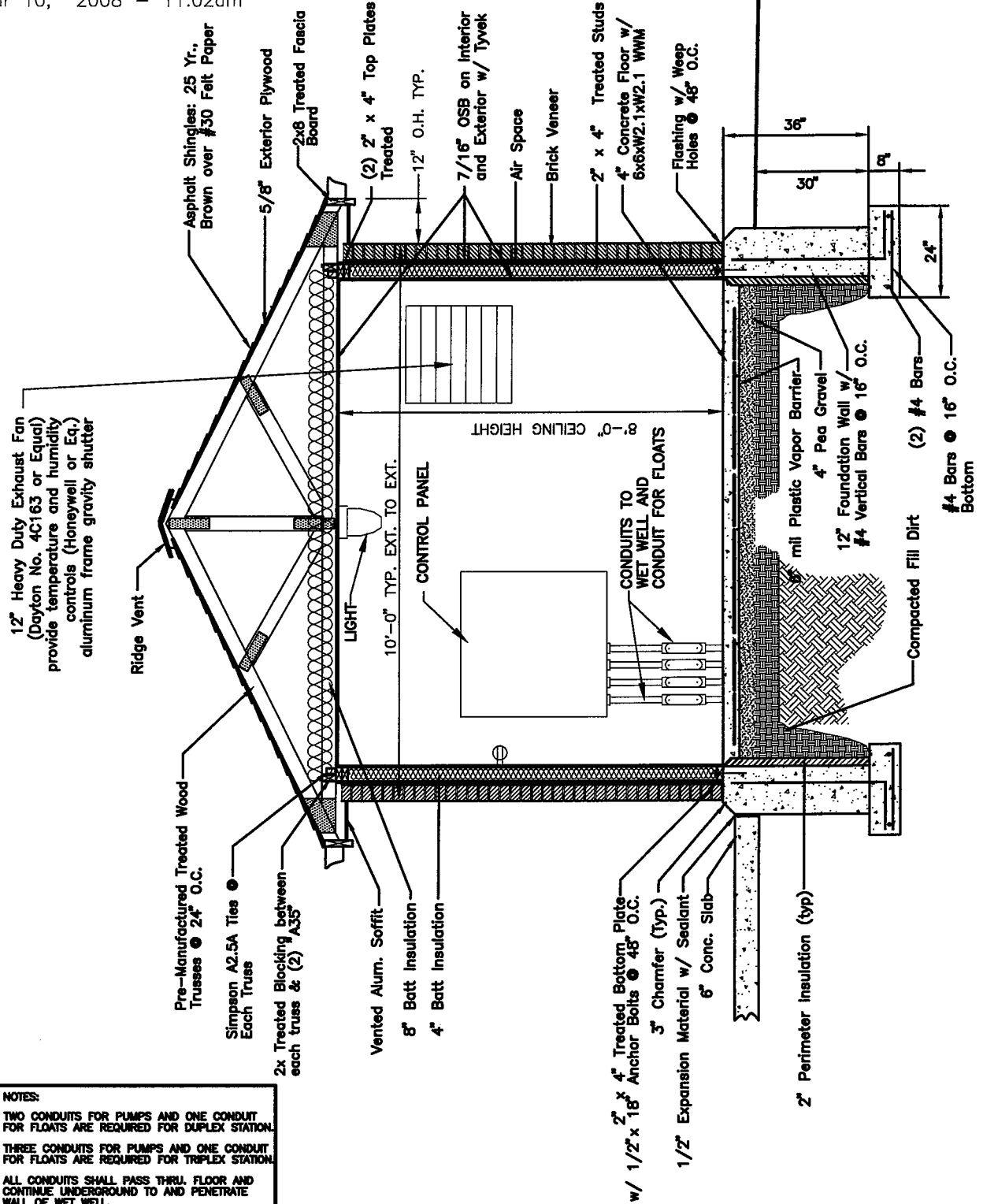
NO.	REVISION	DATE
1	QUICK CONNECTS	05-04-99
2	PRESSURE GAGE	04-12-00
3	FM ISO-VALVE	04-12-00
4	FLOW MONITOR M.H.	01-06-03
5	DELETE FLOW MONITOR M.H. ADD METERING M.H.	02-12-08

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
APPROVED _____ DATE _____
APPROVED _____ DATE _____

FIGURE

A7.2



LIFT STATION CONTROL BUILDING SECTION

TOWN of NEWBURGH, INDIANA

NO.	REVISION	DATE
1	NEW	01-03

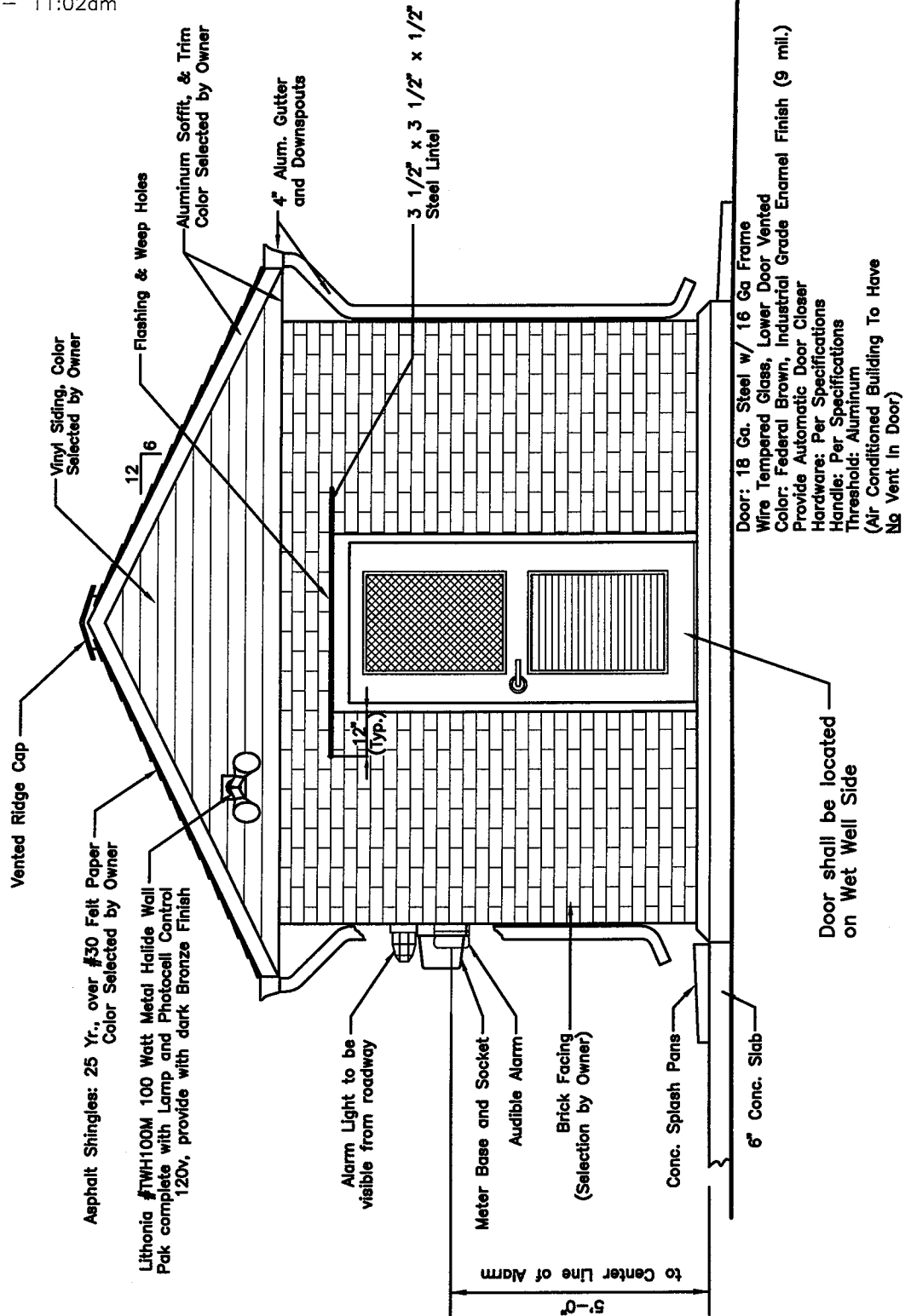
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A7.3



LIFT STATION CONTROL BUILDING ELEVATION

NO.	REVISION	DATE
1	NEW	01-03

TOWN of NEWBURGH, INDIANA

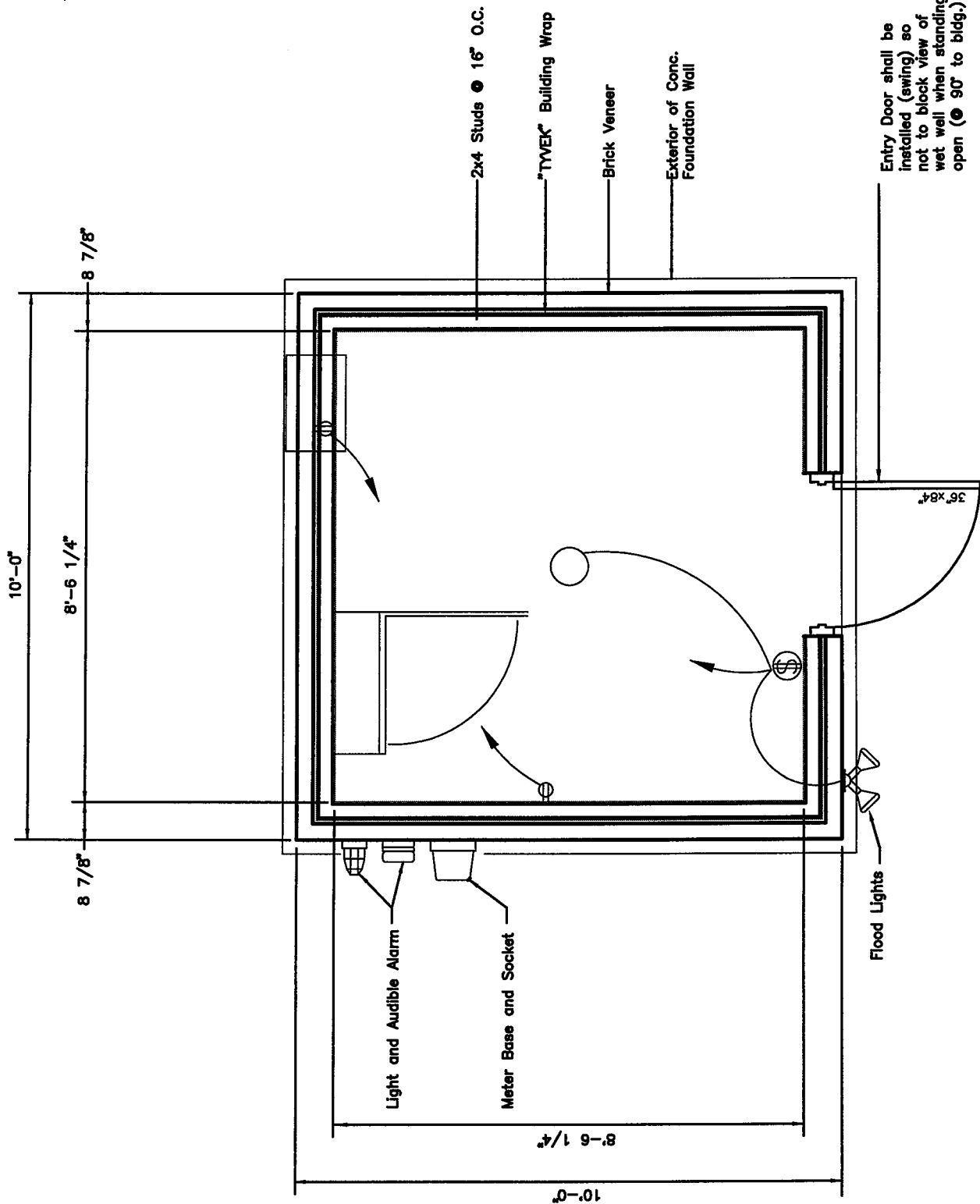
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A7.4



LIFT STATION CONTROL BUILDING PLAN

NO.	REVISION	DATE
1	NEW	01-03

TOWN of NEWBURGH, INDIANA

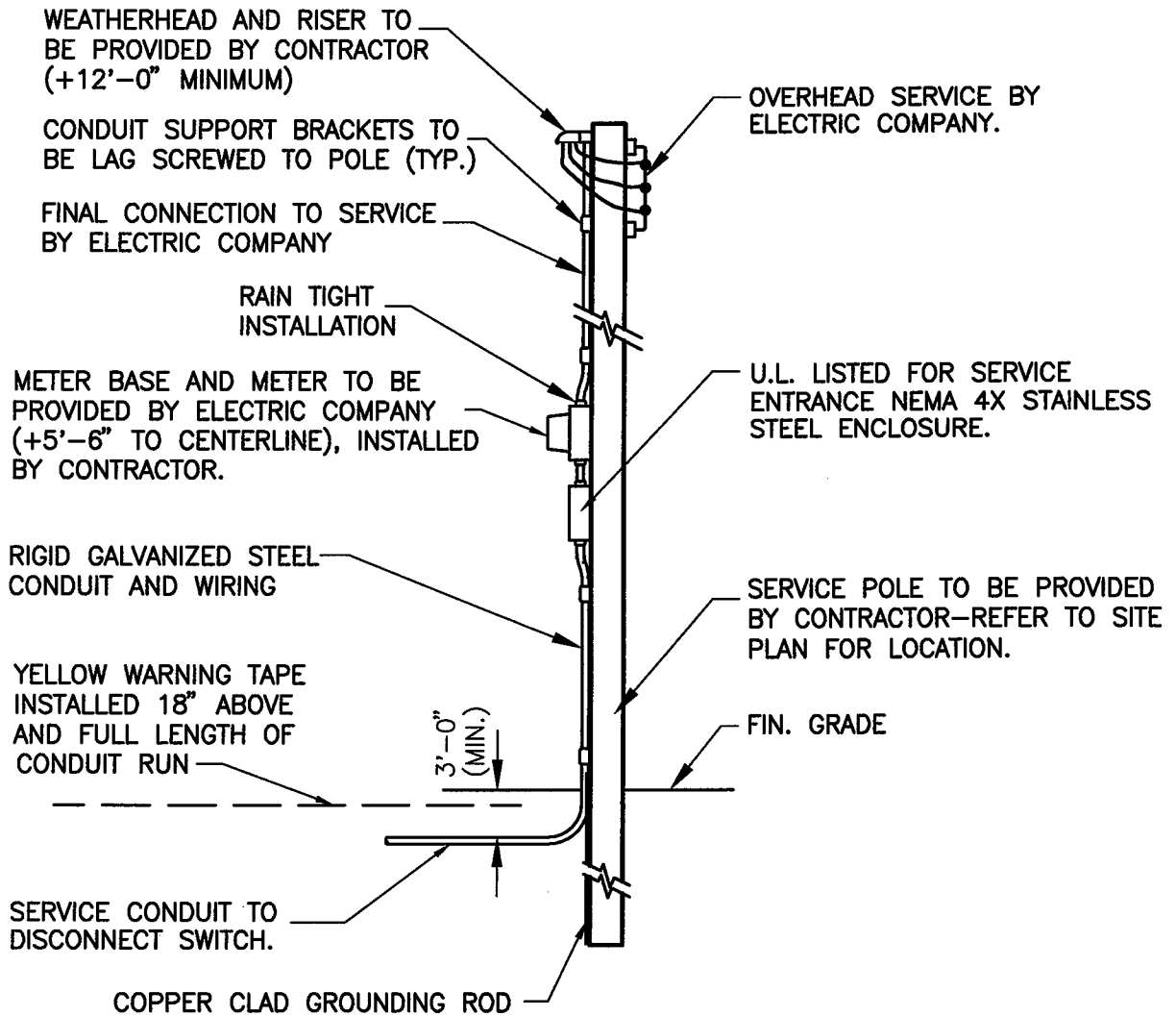
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A7.5



TYPICAL PUMP STATION SERVICE POLE FOR PUMP STATION SERVICES

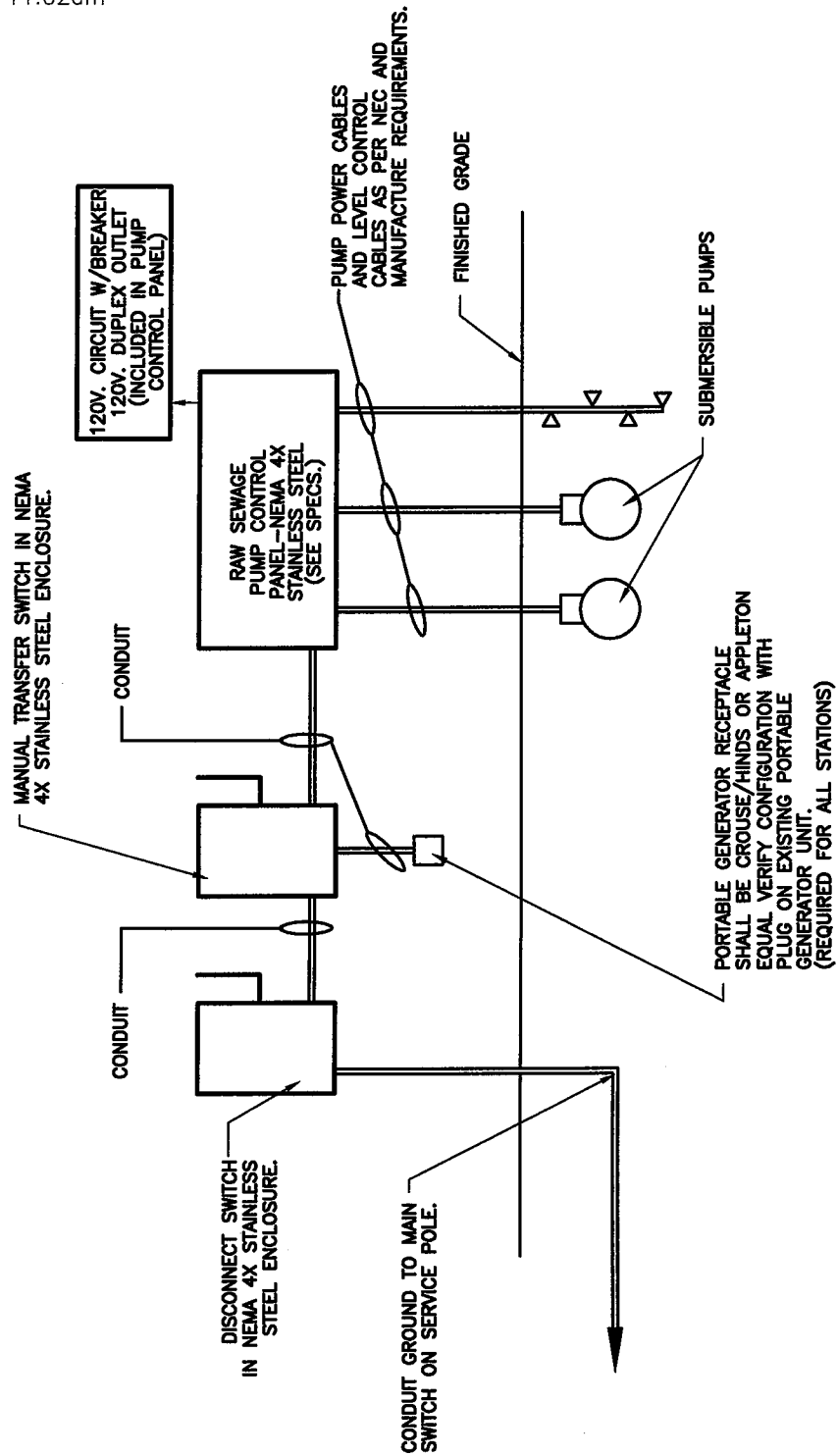
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____	DATE _____
APPROVED _____	DATE _____
APPROVED _____	DATE _____

FIGURE

A7.6



TYPICAL PUMP STATION POWER DISTRIBUTION DIAGRAM

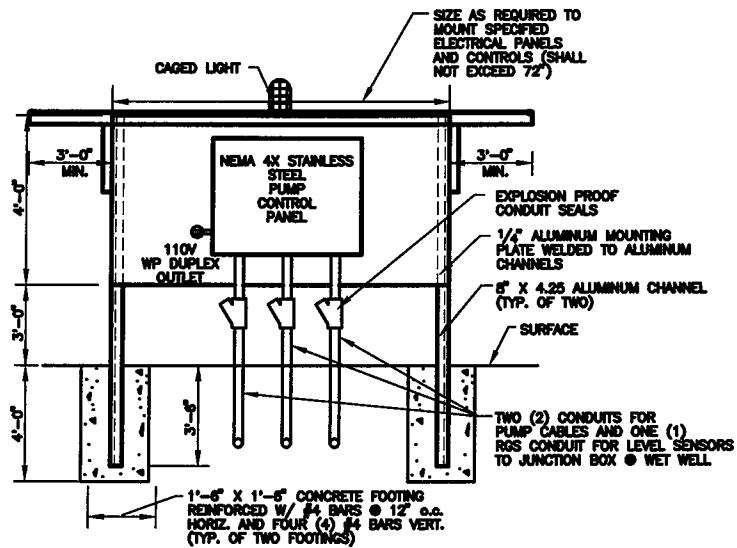
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

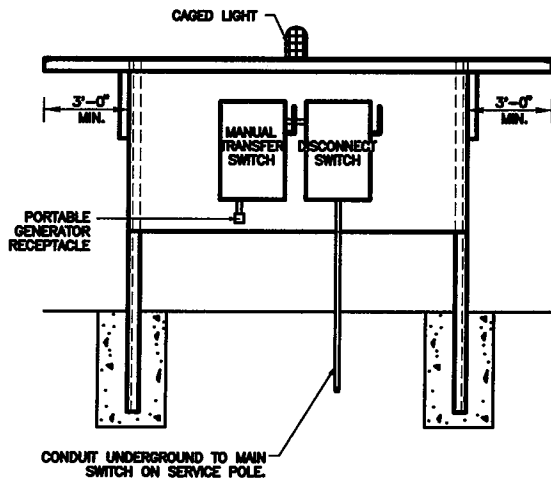
APPROVED _____	DATE _____
APPROVED _____	DATE _____
APPROVED _____	DATE _____

FIGURE

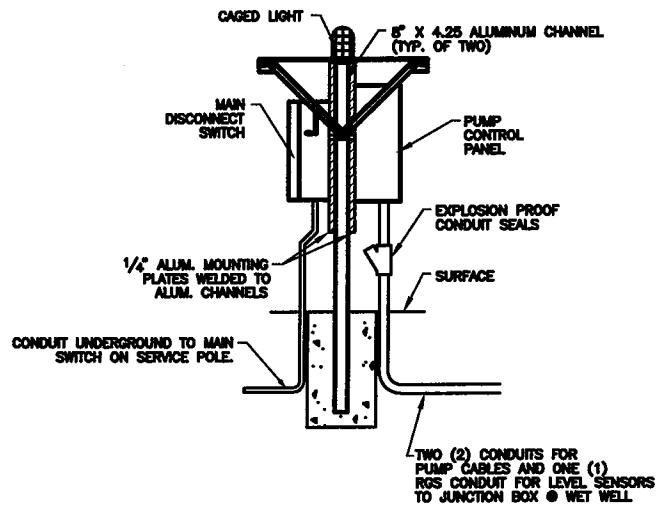
A7.7



FRONT ELEVATION



REAR ELEVATION



SIDE ELEVATION

NOTES:

- 1.) ALL HARDWARE REQUIRED TO ANCHOR ELECTRICAL PANELS AND METER TO MOUNTING PLATE SHALL BE STAINLESS STEEL.
- 2.) AT CONTRACTOR'S OPTION DISCONNECT SWITCH AND MANUAL DISCONNECT SWITCH MAY BE FURNISHED AS PART OF PUMP CONTROL PANEL.

TYPICAL PUMP STATION ELECTRICAL AND PUMP CONTROL MOUNTING DETAIL

NO.	REVISION	DATE
1	NEW	01-03

TOWN of NEWBURGH, INDIANA

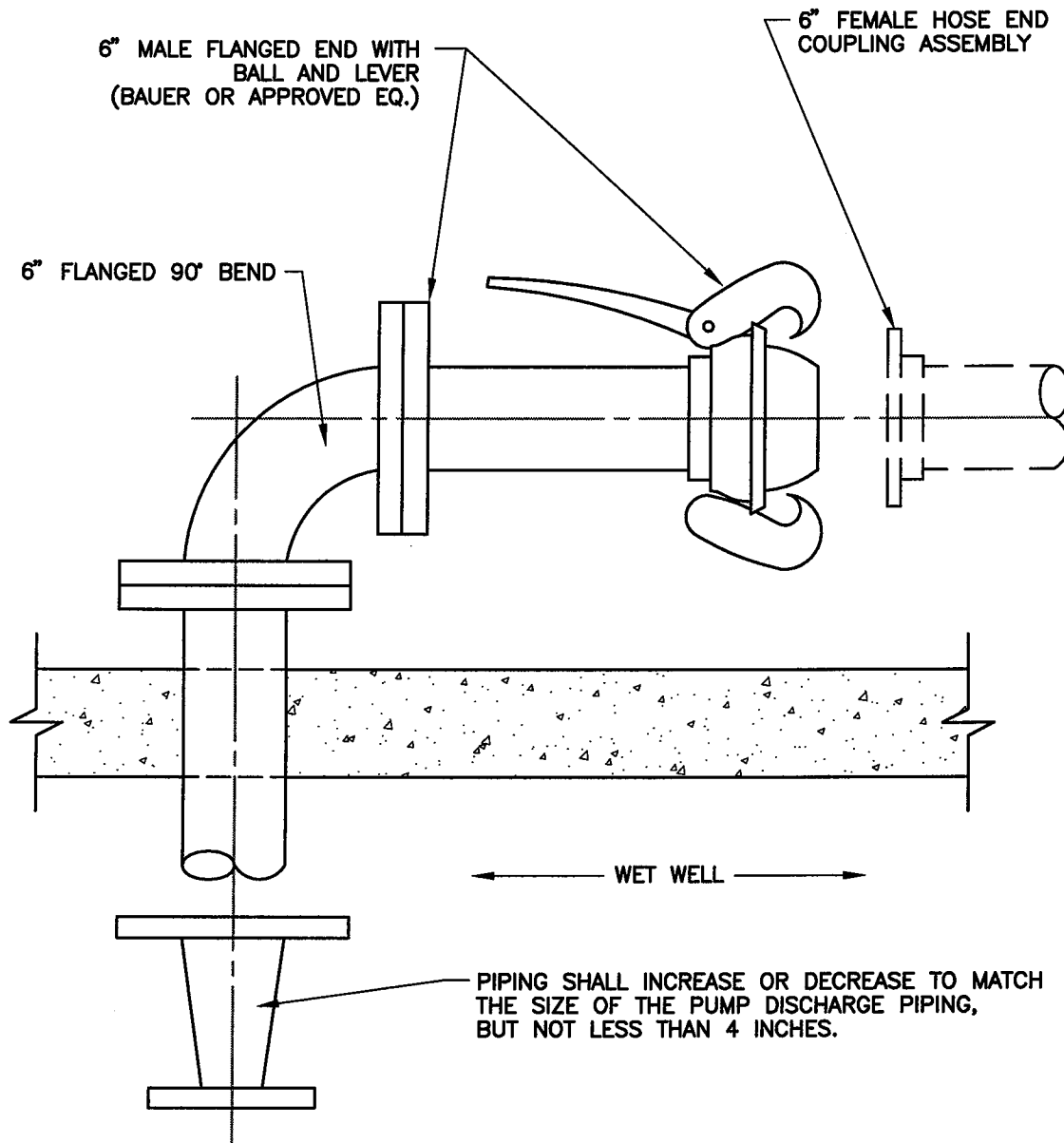
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A7.8



BYPASS PUMP BAUER CONNECTION DETAIL - WET WELL

NO.	REVISION	DATE
1	REPLACE QUICK CONNECT WITH BAUER CONNECT	02-12-08

TOWN of NEWBURGH, INDIANA

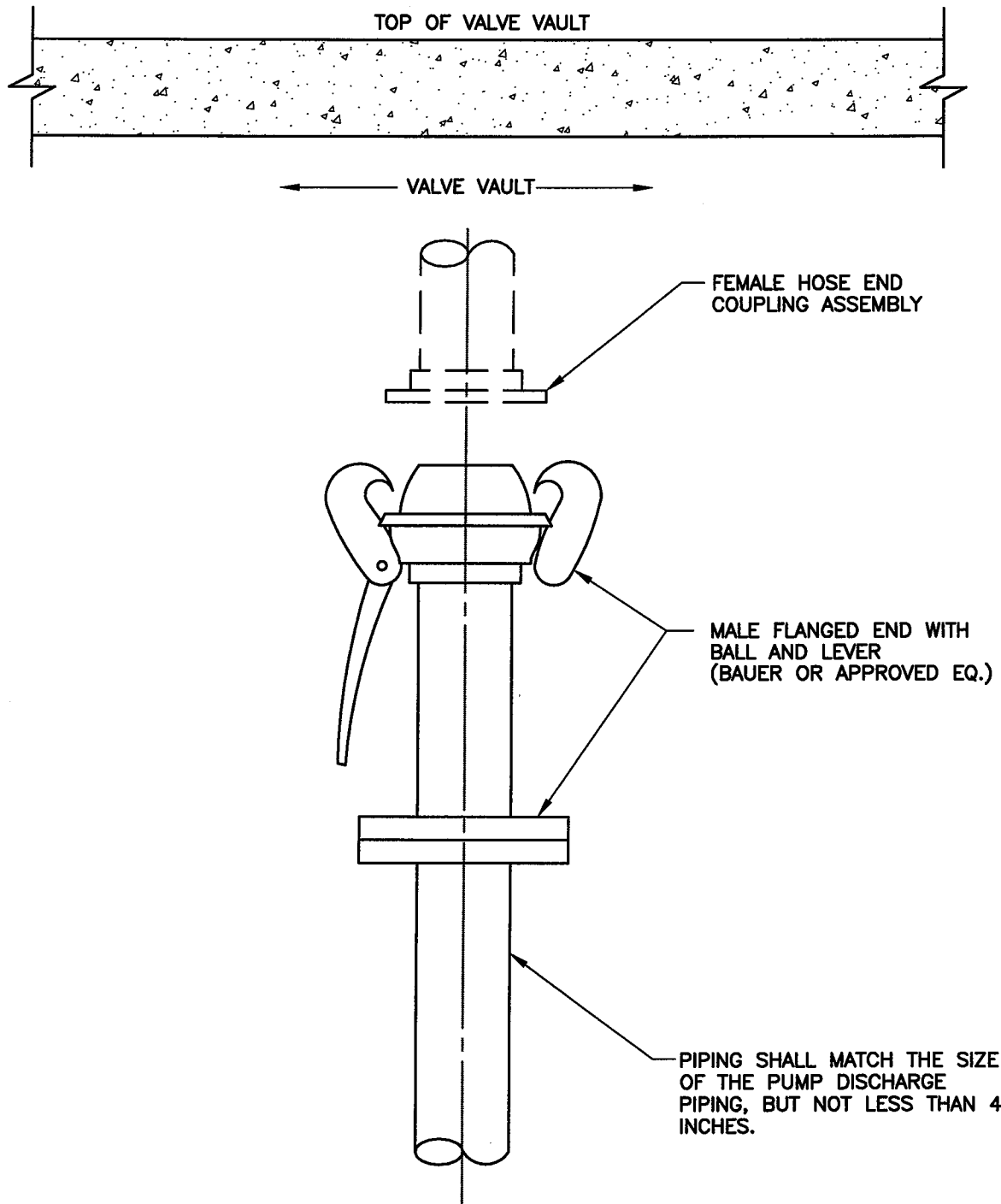
APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A7.9



BYPASS PUMP BAUER CONNECTION DETAIL — VALVE PIT

NO.	REVISION	DATE
1	REPLACE QUICK CONNECT WITH BAUER CONNECT. REMOVE REDUCER	02-12-08

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

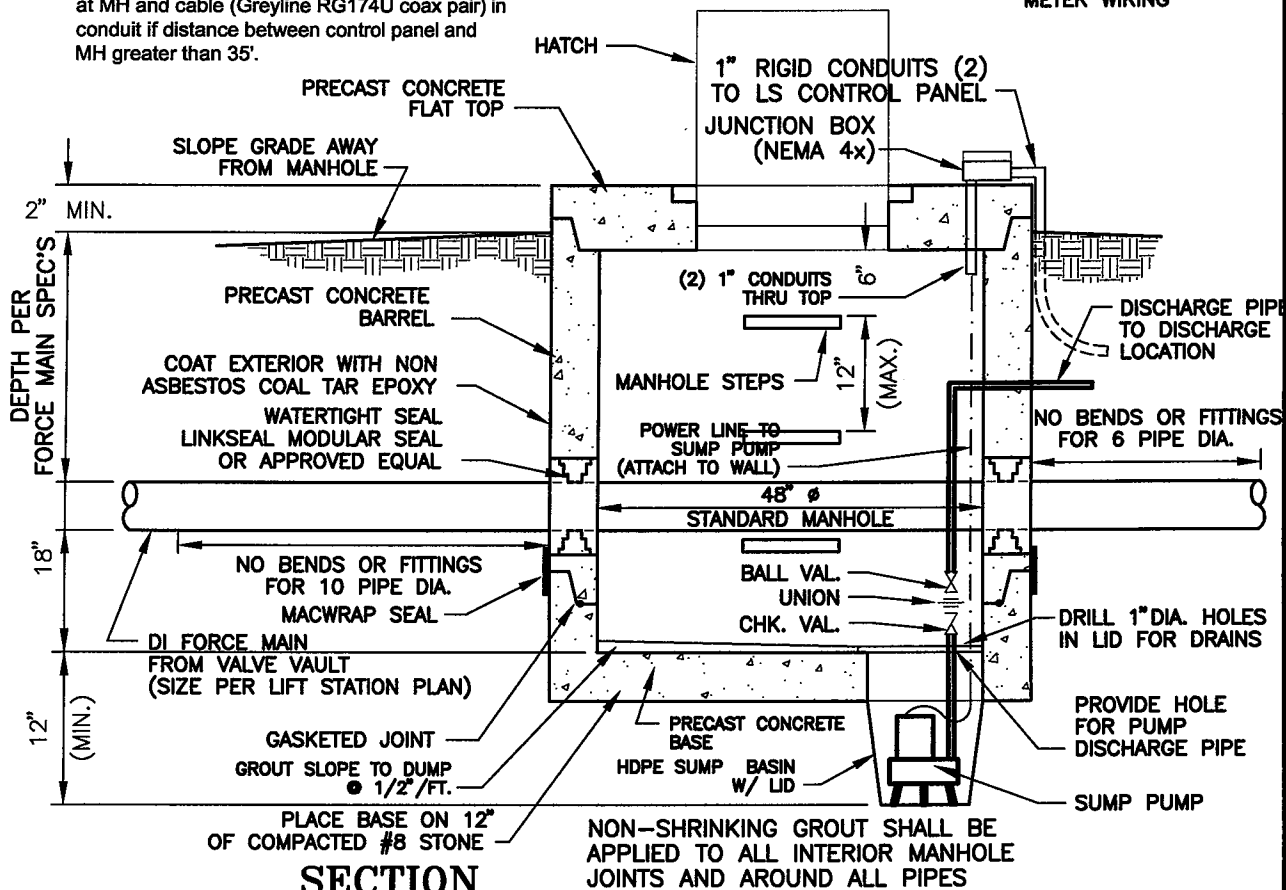
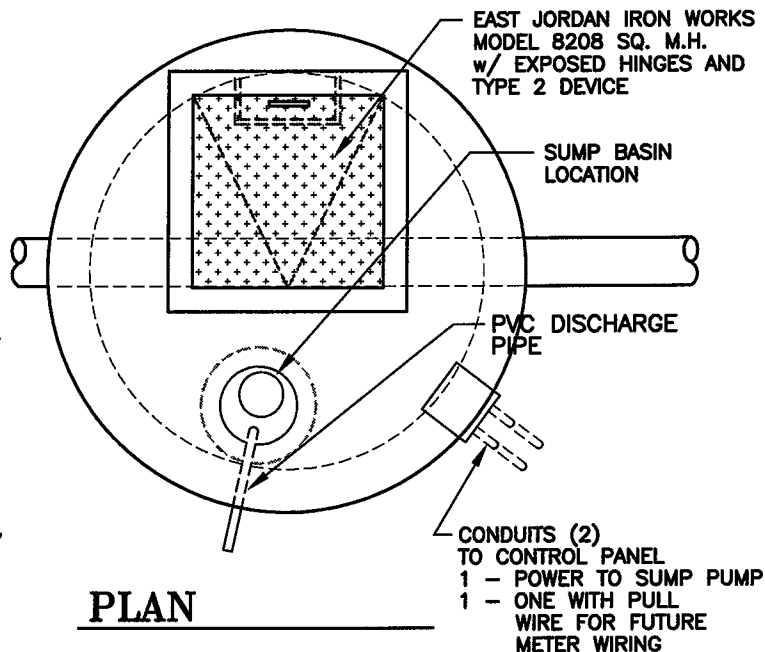
FIGURE

A7.10

Max 11 2008 - 11-51am
A. Pre-Cast Concrete Structures

1. Precast concrete structures shall meet ASTM C478.
2. Joints shall be per ASTM C443.
3. Joint sealer shall be "Kent-Seal No. 2" or equal.
4. Joint collar shall be min. 9" wide and equal to MacWrap Exterior Joint Sealer.

- B. Manhole steps shall be a polypropylene plastic meeting ASTM D4101 encapsulating a 1/2" grade 60 steel reinforcing bar meeting ASTM C478 or ASTM A615 for reinforcing steel cast into manhole barrel.
- C. Sump pit shall be HDPE or structural foam. Size min. 18" dia. x 30" deep with flat top. Fasten to base with minimum six SS concrete anchors. Seal sump pit to manhole base with silicon caulk. No side inlets allowed.
- D. Sump pump shall be 1/2 HP, 115V, 1 ph. submersible with integral float control and 1-1/2" discharge rated at min. 53 gpm @ 10' TDH equal to Water Ace Model R5S-1. Provide grounded 115V, 1 ph, 15A min power to sump pump.
- E. Discharge shall be 1-1/2" Sch. 40 PVC solvent weld discharge piping, fittings, and valves.
- F. Provide separate junction box (Greyline Option JB) at MH and cable (Greyline RG174U coax pair) in conduit if distance between control panel and MH greater than 35'.



SECTION

(SOME ITEMS SHOWN OUT OF VIEW FOR CLARITY)

STANDARD METERING MANHOLE

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____

APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A7.11

GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
2. BARRICADE TYPE II-A AND BARRICADE TYPE II-B WITH SIGNS SHALL INCLUDE CONSTRUCTION SIGNS, TYPICAL SIGN STANDARD, AND CONSTRUCTION WARNING LIGHTS AS SHOWN ON THE STANDARD DETOUR SIGN SHEETS.
3. CONSTRUCTION SIGN TYPE A AND TYPE B SHALL INCLUDE THE SUPPORT, ALL NECESSARY HARDWARE, AND REQUIRED CONSTRUCTION WARNING LIGHTS.
4. THE TEMPORARY BITUMINOUS DIVIDER SHALL INCLUDE THE STANDARD TUBULAR AND TRAFFICPAINT AS SHOWN.
5. THE FOR BARRICADES TYPE II-A AND II-B, BARRICADE TYPE II-B WITH SIGNS, TYPE A AND B CONSTRUCTION SIGNS, AND CONCRETE BARRIER SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
6. WOOD MATERIALS ARE TO BE DIMENSION LUMBER IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
7. STANDARD DRUMS, TYPE I AND TYPE II BARRICADES, SHALL BE USED ON CONVENTIONAL ROADS, URBAN STREETS AND ARTERIALS, ONLY STANDARD DRUMS AND TYPE II BARRICADES SHALL BE USED ON THE EXPRESSWAYS, FREEWAYS, AND OTHER HIGH-SPEED ROADWAYS.
8. UNLESS OTHERWISE SPECIFIED, DRUMS, TYPE I AND TYPE II BARRICADES, CONES, AND TUBULAR MARKERS SHALL BE SPACED AS FOLLOWS:
 - A) NUMERICALLY EQUAL TO THE POSTED SPEED LIMIT, BUT NOT LESS THAN 20 FEET, ON TAPERS;
 - B) 50 FEET FOR A POSTED SPEED OF LESS THAN 40 M.P.H. ON TANGENTS;
 - C) 100 FEET FOR A POSTED SPEED EQUAL TO OR GREATER THAN 40 M.P.H. ON TANGENTS.
9. STANDARD CONES AND TUBULAR MARKERS SHALL BE A MINIMUM OF 18 INCHES IN HEIGHT FOR POSTED SPEEDS UP THROUGH 40 M.P.H. AND A MINIMUM OF 28 INCHES FOR POSTED SPEEDS OVER 40 M.P.H.
10. REFLECTORIZED BANDS MAY BE OMITTED FROM CONES OR TUBULAR MARKERS FOR LANE CLOSURES DURING DAYLIGHT HOURS.
11. THE STRIPES ON BARRICADES TYPE I AND II SHALL SLOPE DOWNWARD TOWARD THAT SIDE ON WHICH THE APPROACHING VEHICLE MUST PASS. FOR TYPE II-A AND II-B BARRICADES, THE STRIPES SHALL SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH THE TRAFFIC MUST TURN IN DETOURING, AND WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED, THE STRIPING SHALL SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE.
12. ALL BARRICADES SHALL HAVE REFLECTORIZED STRIPING ON THOSE SIDES WHICH ARE APPROACHABLE BY TRAFFIC. WHEN BARRICADES ARE APPROACHABLE BY TRAFFIC IN BOTH DIRECTIONS, SPECIFIED CONSTRUCTION WARNING LIGHTS SHALL HAVE BI-DIRECTIONAL LENSES.
13. FOR BARRICADES TYPE I AND II LESS THAN 3 FEET IN LENGTH, THE WIDTH OF THE STRIPES SHALL BE 4 INCHES.
14. ALL BARRICADES SHALL BE WEIGHTED WITH SANDBAGS FOR STABILITY AS SHOWN.
15. THE DETOUR ARROW SIGN SHALL BE USED ONLY WHEN A DETOUR ROUTE HAS BEEN SIGNED.
16. UNLESS OTHERWISE SPECIFIED, CONSTRUCTION SIGNS SHALL BE MOUNTED ON PORTABLE OR NON-PORTABLE SUPPORTS ONLY AS DESCRIBED HEREIN. A PORTABLE SUPPORT IS A TYPICAL SIGN STANDARD AS SHOWN ON THIS SHEET, OR SMALL LIGHT WEIGHT TRAILER IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. NON-PORTABLE SUPPORTS ARE DRIVEN METAL OR WOODEN POSTS AS DESIGNATED ON STANDARD DETOUR SIGN SHEET 3-A AND SIGN DESIGN DETAILS SHEETS 6 AND 6-A. ALL SIGNS SHALL BE MOUNTED SUCH THAT THE MESSAGE ON THE SIGN IS LEVEL IN THE HORIZONTAL PLANE AFTER PLACEMENT.
17. THE MINIMUM VERTICAL CLEARANCE FOR CONSTRUCTION SIGNS SHALL BE AS FOLLOWS:
 - A) 7 FEET BETWEEN THE TOP OF THE CURB AND THE BOTTOM OF THE SIGN ON CURBED ROADWAY SECTIONS;
 - B) 5 FEET BETWEEN THE EDGE OF PAVEMENT AND THE BOTTOM OF THE SIGN ON NON-CURBED ROADWAY SECTIONS;
 - C) AN ADVISORY SPEED PLATE, REQUIRED TO BE PLACED WITH ANOTHER WARNING SIGN, SHALL BE MOUNTED ON THE POST CLOSEST TO THE ROADWAY AT A MINIMUM CLEARANCE OF 4 FEET ABOVE THE EDGE OF PAVEMENT. THE BOTTOM OF THE CONSTRUCTION WARNING SIGN SHALL NOT BE LOWER THAN THE TOP OF THE ADVISORY SPEED PLATE.
18. THE MINIMUM HORIZONTAL CLEARANCE FOR CONSTRUCTION ON NON-CURBED ROADWAY SECTIONS SHALL BE AS FOLLOWS:
 - A) THE GREATER OF 12 FEET FROM THE EDGE OF THE PAVEMENT OR 6 FEET FROM THE EDGE OF THE PAVED SHOULDER TO THE NEAR EDGE OF THE SIGN FOR NON-PORTABLE SUPPORT MOUNTED SIGNS AND FOR PORTABLE SUPPORT MOUNTED SIGNS DURING THE NIGHT-TIME HOURS;
 - B) 6 FEET FROM THE EDGE OF PAVEMENT TO THE NEAR EDGE OF THE SIGN FOR PORTABLE SUPPORT MOUNTED SIGNS DURING DAYLIGHT HOURS.
19. THE MINIMUM HORIZONTAL CLEARANCE FOR CONSTRUCTION SIGNS ON CURBED ROADWAY SECTIONS SHALL BE 2 FEET FROM THE FACE OF THE CURB TO THE NEAR EDGE OF THE SIGN.
20. LATERAL PLACEMENT OF CONSTRUCTION SIGNS MAY BE ADJUSTED BY THE ENGINEER ONLY IF R/W IS RESTRICTED.
21. A 1 FOOT SECTION OF THE CONCRETE BARRIER SHALL BE REMOVED OR OMITTED EVERY 25 FEET TO PROVIDE DRAINAGE ON TILT PAVEMENTS.

TRAFFIC CONTROL

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____

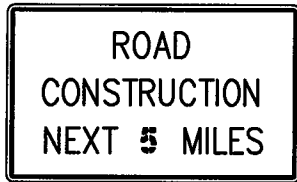
APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A8.1

38



XG20-1
60"x36"

39



XG20-2
60"x24"

40



XG20-2a
60"x24"

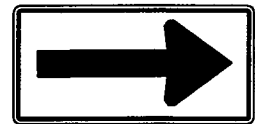
41 42



XM4-9(R or L)
30"x24"

XM4-9-B(R or L)
60"x48"

43 44



XW1-6
48"x24"

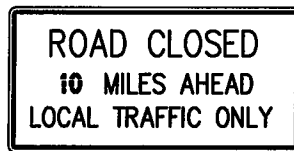
XW1-6-A
60"x30"

45



R11-2
48"x30"

46



R11-3
60"x30"

47



R11-4
60"x30"

TRAFFIC CONTROL SIGN DETAILS

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

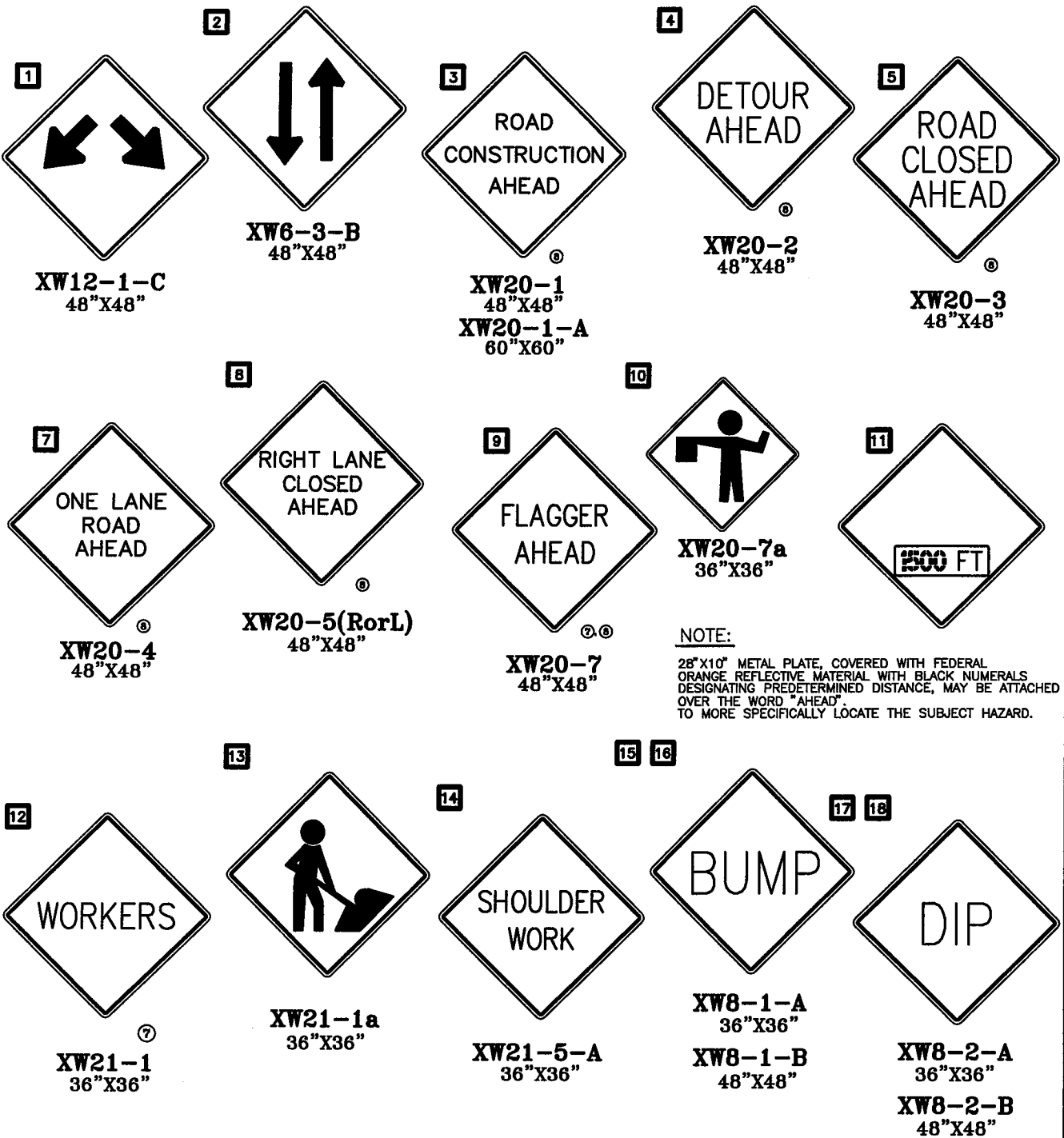
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APPROVED _____ DATE _____

FIGURE

A8.2



NOTE:
28"x10" METAL PLATE, COVERED WITH FEDERAL ORANGE REFLECTIVE MATERIAL WITH BLACK NUMERALS DESIGNATING PREDETERMINED DISTANCE, MAY BE ATTACHED OVER THE WORD "AHEAD" TO MORE SPECIFICALLY LOCATE THE SUBJECT HAZARD.

TRAFFIC CONTROL SIGN DETAILS

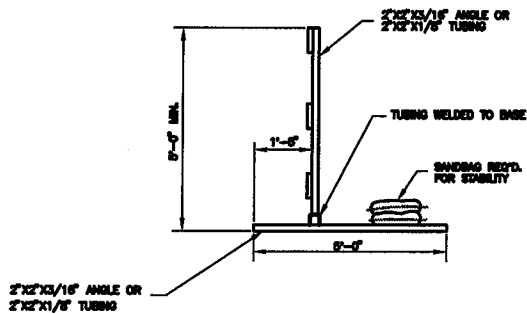
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TOWN of NEWBURGH, INDIANA

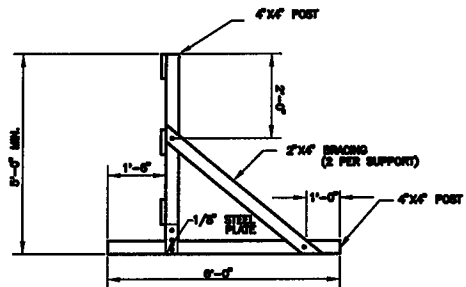
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APPROVED _____	DATE _____
APPROVED _____	DATE _____

FIGURE

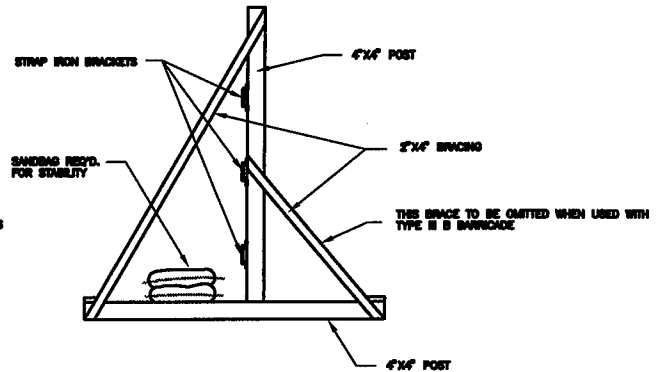
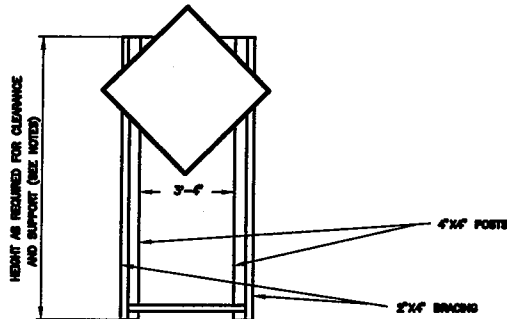
A8.3



STEEL SUPPORTS



WOOD SUPPORTS



DETAIL OF TYPICAL SIGN STANDARD (T.S.S.)

TRAFFIC CONTROL SIGN STANDARD DETAILS

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____



















APPROVED _____ DATE _____

APPROVED _____ DATE _____

FIGURE

A8.4

LEGEND

-  REMOVAL OF LANE LINE OR EDGE LINE AS SHOWN.
-  FLASHING ARROW SIGN
-  TYPE II-A OR II-B BARRICADES AS SHOWN
-  DRUM OR BARRICADES TYPE II
-  TYPE "K" CONSTRUCTION WARNING LIGHT
-  MINIMUM LENGTH OF TAPER.
- $L = 200V$
- $L = \frac{V^2}{50}$
- $S =$ POSTED SPEED OR 85TH PERCENTILE SPEED
- $W =$ WIDTH OF OFFSET
-  FLAGGER
-  WORK SITE
-  FLASHING ARROW BOARD
-  TYPE I OR II BARRICADES OR CONES (REFER TO SHEET 2A DETOURS)
-  POLICE CAR (OPTIONAL)
-  SIGN AND SUPPORTS (REFER TO SHEET 2A, 3A, 5 AND 6A DETOURS)
-  MINIMUM LENGTH OF TAPER
-  LOW INTENSITY FLASHING YELLOW LIGHT (TYPE "K")
-  DETOUR ROUTE MARKER ASSEMBLIES (SEE DETAILS BELOW)
-  TYPE "B" CONSTRUCTION WARNING LIGHTS
-  TYPICAL SIGN STANDARD
-  DRUMS OR BARRICADES TYPE I OR TYPE II

GENERAL NOTES

- 1.) CONSTRUCTION WARNING LIGHTS SHALL BE REQUIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
- 2.) ADDITIONAL SIGNS AND BARRICADES SHALL BE REQUIRED AS DIRECTED.
- 3.) SPACING OF DRUMS AND BARRICADES TYPE II AT THIS LOCATION SHALL BE 20 FEET.
- 4.) FOR TEMPORARY LANE CLOSURES DURING DAYLIGHT HOURS, CONES OR TUBULAR MARKERS MAY BE USED IN LIEU OF DRUMS OR BARRICADES TYPE II.
- 5.) TEMPORARY PAVEMENT MARKINGS SHALL NOT BE REQUIRED FOR TEMPORARY DAYLIGHT LANE CLOSURES.
- 6.) FOR UN-NUMBERED ROUTES, STREET SIGNS OR COUNTRY ROAD SIGNS SHALL BE USED IN LIEU OF THE ROUTE MARKER SIGN IN THE DETOUR ROUTE MARKER ASSEMBLY.

NOTES:

1. The "Flagger (head)" sign (W20-7, 48" x 48") may be substituted for the symbol sign (W20 - 76-A).
2. All distances shown are typical, except for minimum distances and may be varied based on field conditions.
3. In urban areas, the arrow board shall not be placed on the sidewalk or side. The arrow board shall be placed at a distance of 1/3 L from the beginning of the taper.
4. For those applications not shown on the sheet. Refer to the miscellaneous standard detour sheets.
5. Approved lights shall mark barricades, drums and continuously at night.
6. The spacing of barricades (Type I & II) and cones shall be as follows:
 - (A.) For tapers, the spacing shall be numerically equal in feet to the posted speed limit in miles per hour with a minimum spacing of 20 feet.
 - (B.) For tangents when the posted speed is 40 M.P.H., or greater, the spacing shall 100 feet.
 - (C.) For tangents when the posted speed is less than 40 M.P.H., the spacing shall be 50 feet.

TRAFFIC CONTROL DEVICE LEGEND AND GENERAL NOTES

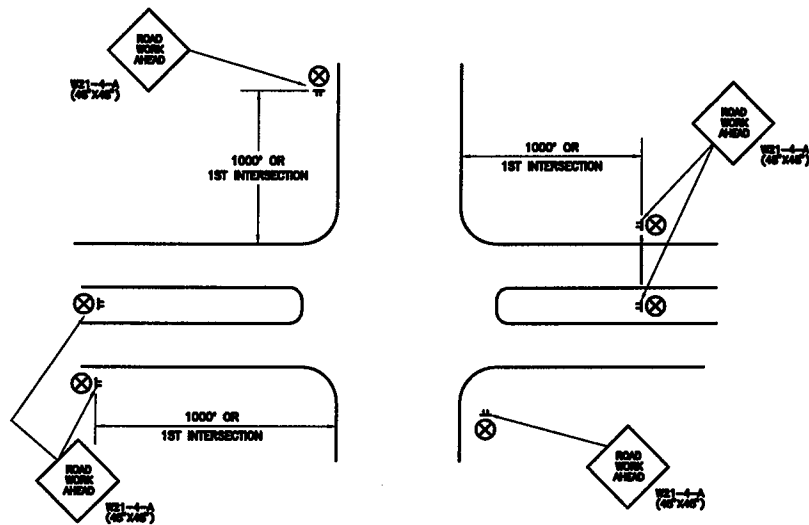
NO.	REVISION	DATE	TOWN of NEWBURGH, INDIANA		FIGURE
					A8.5
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	



TOWN of NEWBURGH, INDIANA

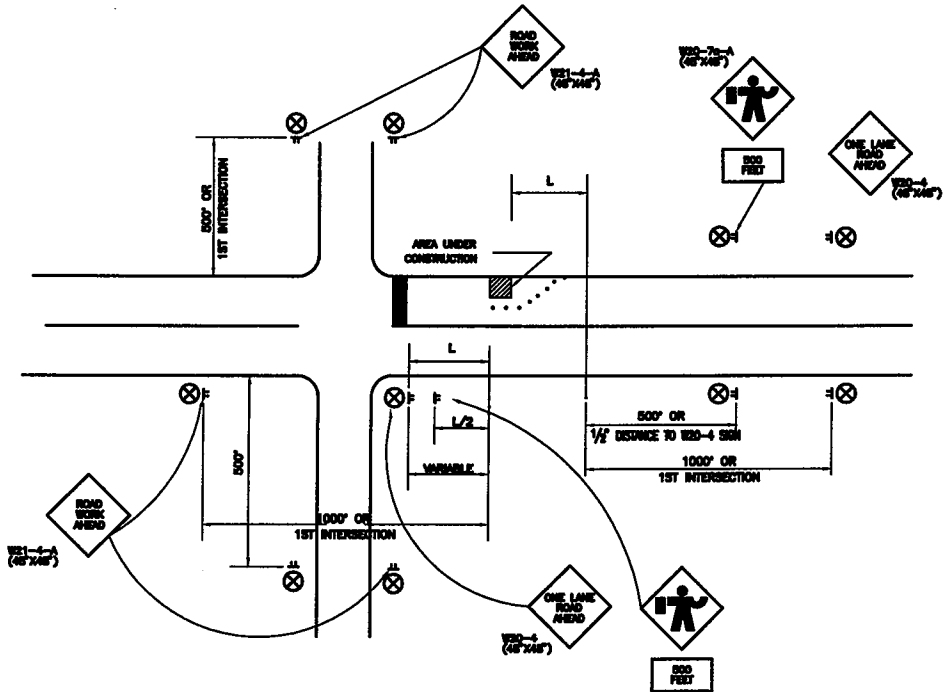
FIGURE

A8.6



CONSTRUCTION AT INTERSECTION

DETAIL NO. 2



CONSTRUCTION ON PAVEMENT (2 LANES)

DETAIL NO. 3

**TRAFFIC CONTROL
DEVICE LOCATIONS**

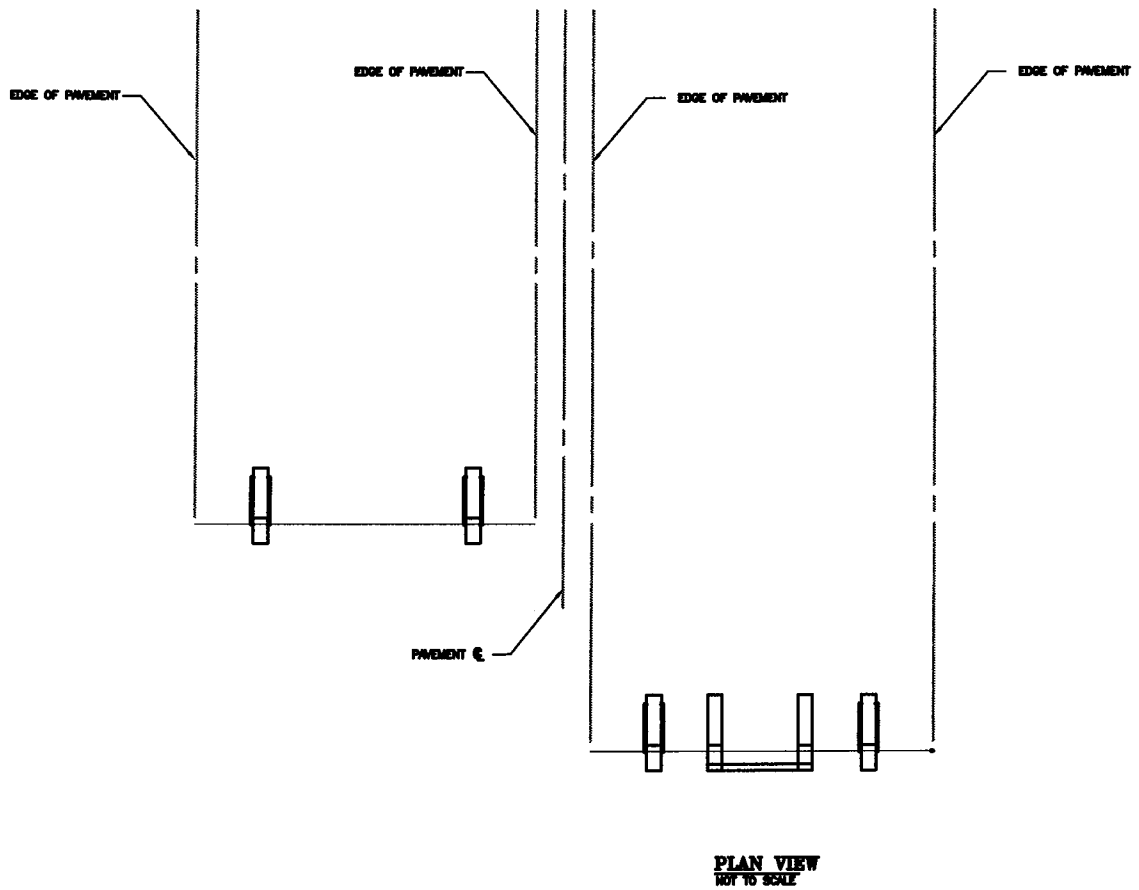
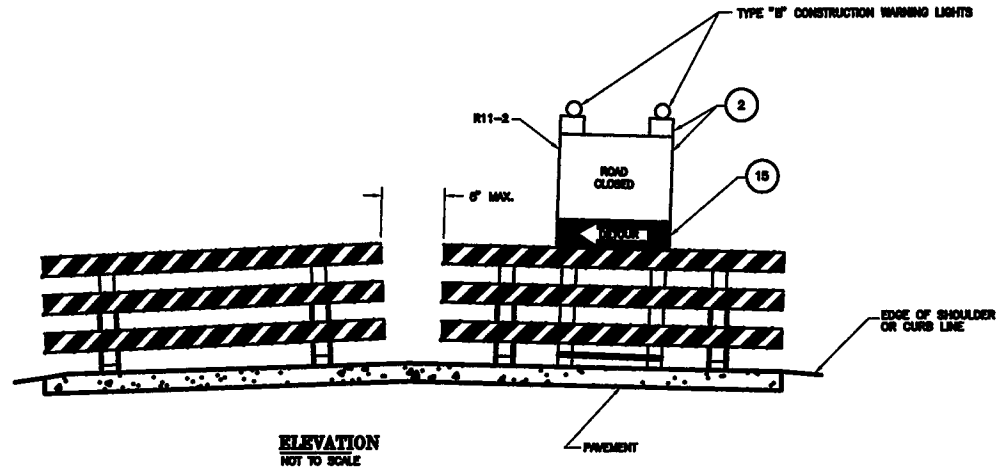
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
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 APPROVED _____ DATE _____

FIGURE

A8.7



TRAFFIC CONTROL BARRICADE DETAILS

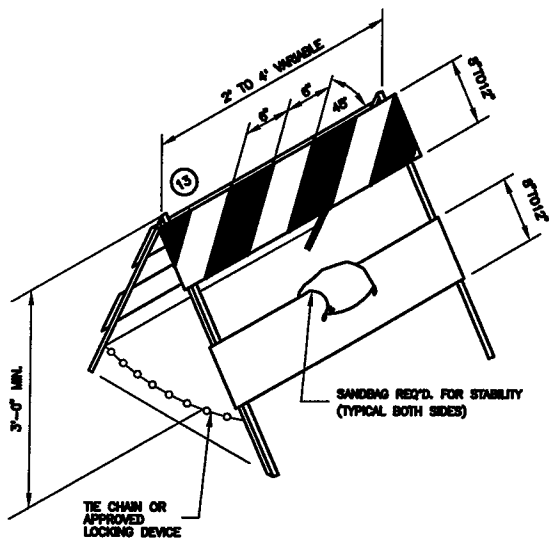
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

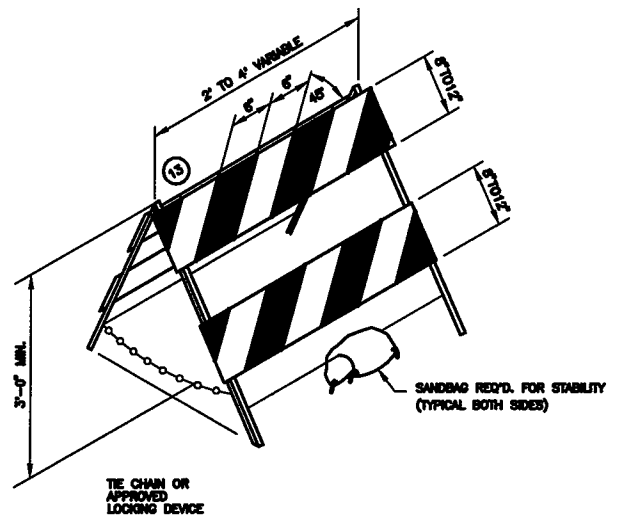
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FIGURE

A8.8



BARRICADE TYPE I



BARRICADE TYPE II

TRAFFIC CONTROL BARRICADE TYPE I AND II DETAILS

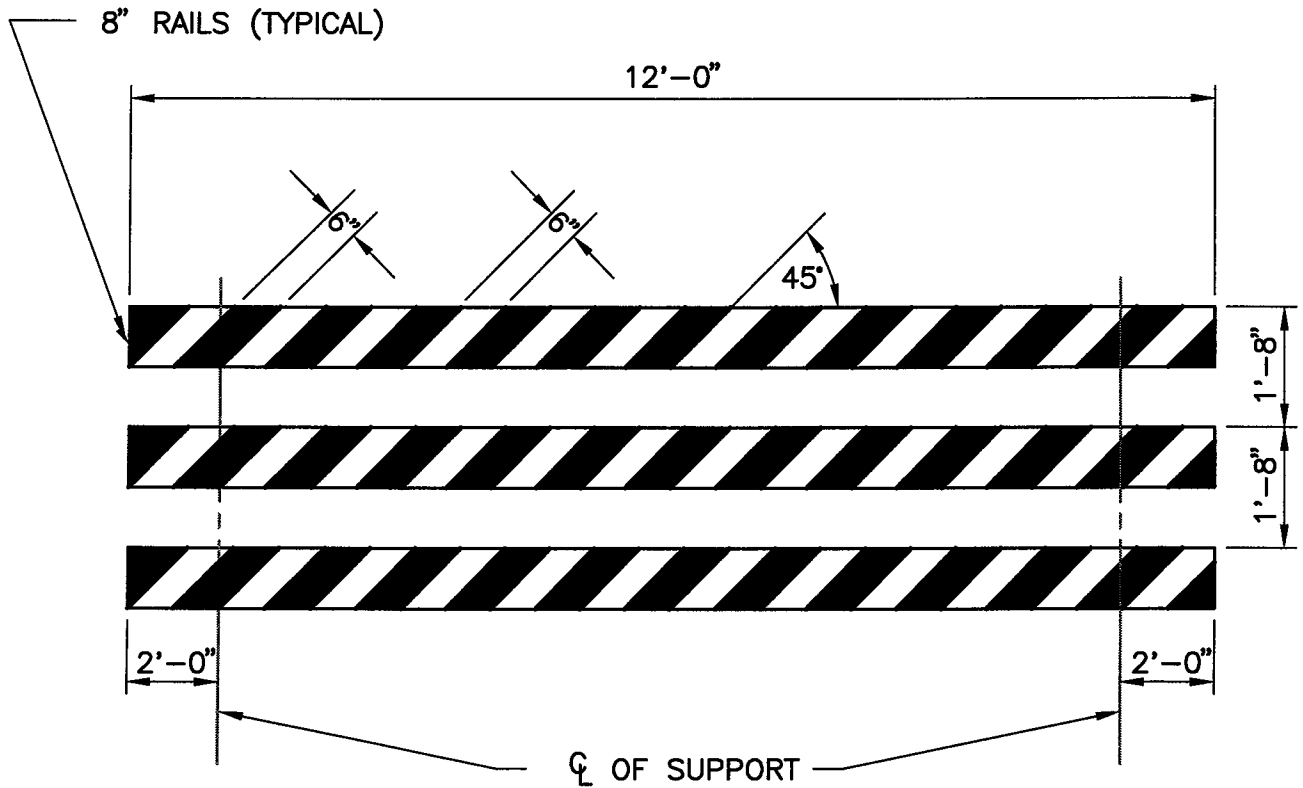
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____	DATE _____
APPROVED _____	DATE _____
APPROVED _____	DATE _____

FIGURE

A8.9



NOTE: RAILS SHALL BE REFLECTORIZED
ON BOTH SIDES

TRAFFIC CONTROL BARRICADE TYPE III-B DETAILS

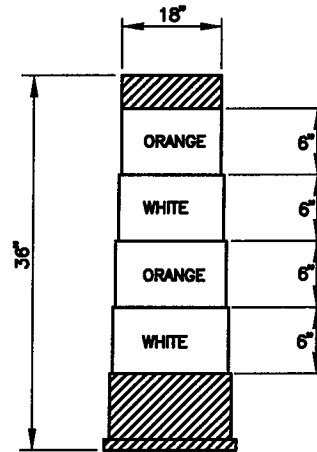
NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____	DATE _____
APPROVED _____	DATE _____
APPROVED _____	DATE _____

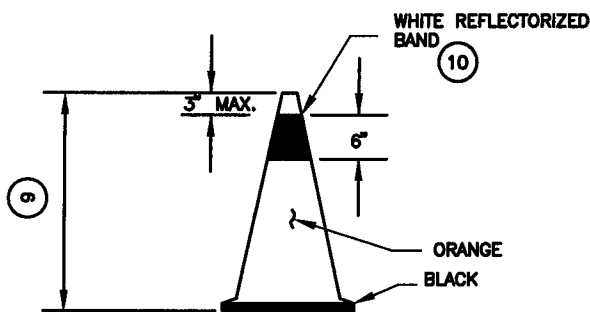
FIGURE

A8.10

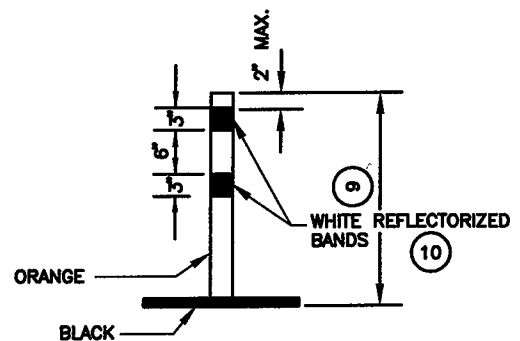


 BLACK OR OTHER APPROVED COLOR

STANDARD DRUM



STANDARD CONE



**STANDARD TUBULAR
MARKER**

**TRAFFIC CONTROL
CONE/DRUM/TUBULAR MARKER DETAILS**

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
 APPROVED _____ DATE _____
 APPROVED _____ DATE _____

FIGURE

A8.11

GENERAL NOTES

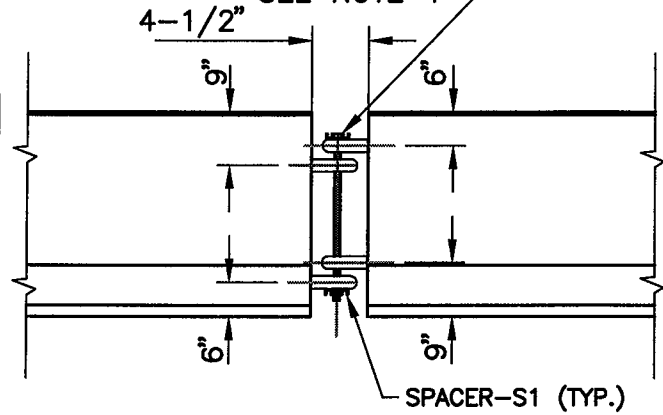
1. TEMPORARY CONCRETE BARRIER SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. INDOT, LATEST EDITION.
2. TEMPORARY CONCRETE BARRIER SHALL BE DELINEATED AS SHOWN. TYPE "C" CONSTRUCTION WARNING LIGHTS SHALL BE ATTACHED AS SHOWN AND SHALL BE SPACED NUMERICALLY EQUAL TO THE 85 PERCENTILE SPEED WITH A MINIMUM SPACING OF 20' C-C. WIDE ANGLE REFLECTORS SHALL BE MOUNTED AS SHOWN AND SHALL BE REQUIRED ON BOTH SIDES OF THE BARRIER WHEN THE BARRIER IS USED TO SEPARATE OPPOSING TRAFFIC.
3. THE DIMENSION OF THE LIFTING SLOTS ARE SUBJECT TO ADJUSTMENT AS NECESSARY TO ACCOMODATE HANDLING EQUIPMENT.
4. HEX NUT MAY BE TACK WELDED TO BOTTOM SPACER TO FACILITATE INSTALLATION AND REMOVAL. BOLTS SHALL BE TORQUED ONLY TO TIGHT CONDITION. CLEARANCE BETWEEN SPACER S1 AND THE ENDS OF THE BARRIER SHOULD ALLOW ANGULAR DEFLECTION AT THE JOINTS TO PERMIT FLARE RATE OF 10:1.
5. WHEN ANCHORING AGAINST LATERAL MOVEMENT IS SPECIFIED FOR TEMPORARY CONCRETE BARRIER LOCATED ON CONCRETE OR BITUMINOUS PAVEMENT OR SHOULDER, THE METHOD OF ANCHORING SHALL BE AS SHOWN AND SHALL BE ACCORDANCE WITH THE STANDARD SPECIFICATIONS. INDOT, LATEST EDITION.

TRAFFIC CONTROL CONCRETE BARRIER GENERAL NOTES

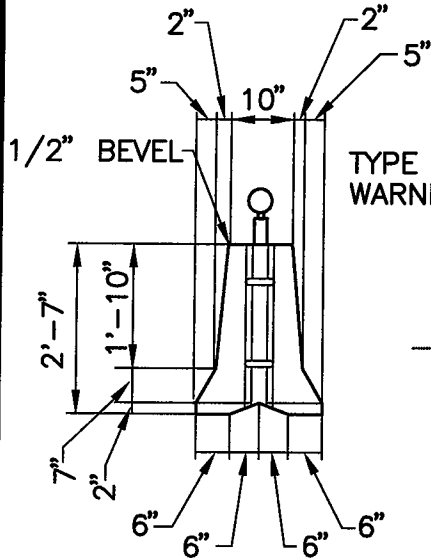
NO.	REVISION	DATE	TOWN of NEWBURGH, INDIANA		FIGURE
			APPROVED _____	DATE _____	A8.12
			APPROVED _____	DATE _____	
			APPROVED _____	DATE _____	
				DATE _____	

1" DIA. BOLT X1'-10 (4" MIN. THREAD, HEX HEAD AND HEX NUT)
SEE NOTE 4

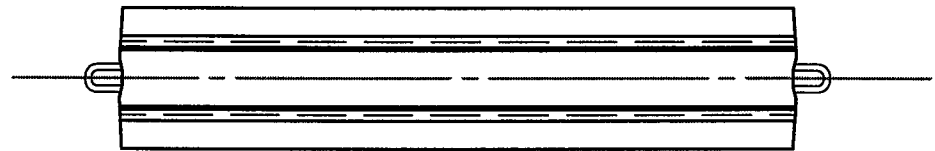
TABLE NO. 1	
CONSTR. ZONE SPEED	TAPER FLARE RATE
20	10:1



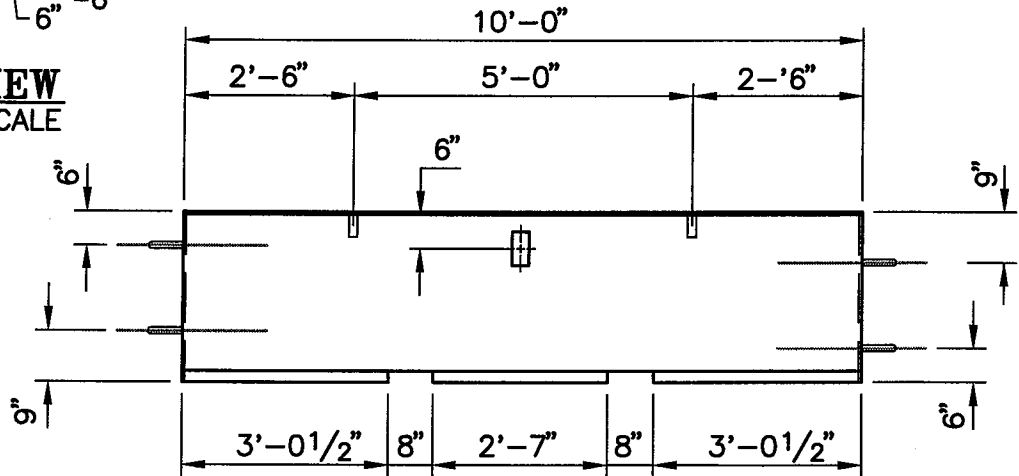
FRONT VIEW
NOT TO SCALE



END VIEW
NOT TO SCALE



TOP VIEW
NOT TO SCALE



FRONT VIEW
NOT TO SCALE

TRAFFIC CONTROL CONCRETE BARRIER DETAIL

NO.	REVISION	DATE

TOWN of NEWBURGH, INDIANA

APPROVED _____ DATE _____
APPROVED _____ DATE _____
APPROVED _____ DATE _____

FIGURE

A8.13

APPENDIX B

APPENDIX “B”
Revision Summaries

Appendix B — Revision Summaries

Revision Date:	September 1998
	May 1999
	April 2000
	November 2003
	March 2008

Town of Newburgh
Sanitary Sewer
Design and Construction Standards
Summary of Changes
March 12, 2008

The following is intended to summarize the revisions made to the Town of Newburgh Sanitary Sewer and Design and Construction Standards. The revisions were completed in the Spring of 2008.

1. Steel casing pipes to be provided for all sanitary sewers crossing existing state and county roadways (*Section 5, General Design Standards, 5.02, C. 2.b*).
2. Sewer lateral extensions cannot be extended from existing sanitary sewer trunk lines (*Section 5, General Design Standards, 5.02.B.2*).
3. As-built drawings shall be submitted using the same drafting standards as required in (*Section 5, General Design Standards, 5.05.F*).
4. Add Chemical feed line details into wetwell and control building (*Section 7, Sanitary Sewer Lift Stations, 7.10.7*).
5. Reference to allowing doghouse manholes "only with special approval" (*Appendix A, Standard Details, A1.4*).
6. O-ring gaskets are to be used exclusively and not in combination with Kent seal mastic (*Section 6, Materials, 6.04.C*).
7. No residential cleanouts shall be installed during the construction of the sewer main. Lateral cleanouts shall be installed at the time the lateral extension is installed (*Section 12, Construction of Sanitary Sewer Laterals, 12B.02*).
8. Solid mechanical coupler shall be utilized when connecting dissimilar pipes (*Section 12, Construction of Sanitary Sewer Service Laterals, 12C.01*).
9. Provided oil separator details (*Appendix A, Standard Details, A2.5*).
10. Eliminate requirement for Class III pipe on manholes over 12 feet in depth (*Section 6, Materials 6.04.C*).
11. Add exterior grease trap coal tar epoxy coating (*Appendix A, A2.4*).
12. Changes to Procedures for Construction Check List (*Section 2, Town Checklist*)
 - a. No. 6, recommend approval or provide a list of changes to the construction plans
 - b. No. 13, substantial completion after testing is complete has been removed
 - c. No. 15, inserted new requirement for attaining substantial completion status
 - d. No. 16, added 90 days to complete the items identified on the deficiency punch list with penalty of "no taps"
 - e. No. 18, removed 3 ½" computer disk and added CD/DVD as an acceptable platform for transferring electronic as-built data
 - f. No. 21, added information on reduction of surety to 10% for one year maintenance bond
13. Eliminate the exterior concrete encasement for the drop manhole (*Appendix A, A1.3*)

14. The pipe inside the manhole shall abut and be flush with the invert of the manhole. The gap between the receiving face of the manhole and the sanitary sewer pipe shall not exceed 1 inch (*Appendix A, A1.5 and Section 6, Materials, 6.04.E.*)
15. Existing buried manholes in agriculture areas shall be raised to grade when development occurs (*Section 5, General Design Standards, 5.02.D.1.*)
16. The as-built plans shall include the location of the lateral in relationship to the downstream manhole, the length of the lateral pipe and the elevation of the end of the stubbed lateral pipe (*Section 5, General Design Standards, 5.05.F.*)
17. Lateral piping for grease traps and oil separators shall be gasketed (*Appendix A, A2.4 and A2.5.*)
18. Manhole grades shall be adjusted in 6 inch increments and shall not exceed 12 inches (*Section 6, Materials, 6.04.F.*)
19. Grease traps shall have a minimum lateral diameter of 6 inches (*Appendix A, A2.4.*)
20. All future utilities, water, gas electric, phone, cable, communications, etc shall be shown on the plan (*Section 5, General Design Standards, 5.05.D.1.J.*)
21. Force main bypass connection shall be located outside of the valve pit (*Appendix A, A7.1.*)
22. Emergency by-pass pump connection size shall match the size of the lift station piping (*Appendix A, A7.1 and A7.10.*)
23. By-pass pump connections shall be manufactured by Bauer (*Appendix A, A7.10.*)
24. Add a valve box to the force main marking detail (*Appendix A, A5.2.*)
25. Deleted reference to galvanized steel guiderails (*Appendix A, A7.1.*)
26. Added spec on interior coating for wetwell (*Section 7, Sanitary Sewer Lift Stations, 7.02K.*)
27. Added reference in specifications to air valve spacing (*Section 5, General Design Standards, 5.03C.3.*)
28. Added description for meter manhole at all stations (*Section 7, Sanitary Sewer Lift Stations, 7.10.A.8.*)
29. The length to width ratio for grease traps shall to 2:1 (*Section 12, Construction of Sanitary Sewer Laterals, Grease Trap Inspection Report and 12B.02.E.I.*)
30. The minimum stone foundation base for grease traps shall be 12 inches (*Section 2, Town Checklists and Section 12, Construction of Sanitary Sewer Service Laterals 12B.02.E.2.*)
31. Revised the word meets to metes (*Section 5, General Design Standards 5.04.C.6*)
32. Revised solids handling capability of pumps to specify 3 inch minimum (*Section 7, Sanitary Lift Station, 7.06.C.*)
33. Removed requirement for pumps motors to be manufactured by U.S. companies (*Section 7, Sanitary Lift Stations, 7.06.K.*)
34. Removed a proprietary specification for cable guide pump rail system (*Section 7, Sanitary Lift Station, 7.07.*)
35. Non-shrink grout application to circumferential interior manhole *joint has been removed* (*Appendix A, A1.1, A1.3, A1.4, A5.5, A5.4.*)
36. Added #4 dowel bars to concrete cradle for drop manhole pipe (*Appendix, A1.3.*)

37. Dog house style manholes have been limited to use with special approval from the utility (*Appendix A, A1.4*).
38. Added note to typical existing manhole entry detail "gap between face of concrete base and pipe shall not exceed 1 inch." (*Appendix A, A1.5*).
39. Standard internal force main into sanitary manholes are limited to use with special permission from the utility (*Appendix A, A5.5*).
40. Standard external force main drop into sanitary manhole has been revised to include mechanical joint ductile iron pipe fittings for the drop, a poured concrete cradle at the base of the force main entering the invert of the manhole and a note stating that the gap between face of concrete base and pipe shall not exceed 2 inches (*Appendix A, A5.A*).
41. The East Jordan model 1022 frame and 1020 cover has been added to the standards as an approved manhole cover (*Appendix A, A1.6 and A1.7*).
42. The limit for lateral construction on sewer mains has been added to the detail for service connection and shallow sewer (*Appendix A, A2.1*).
43. Coal Tar Epoxy coating and waterproof inspection plug has been noted on the typical grease trap detail (*Appendix A, A2.4*).
44. A stainless steel union and note stating 6 inches of clearance between the top of the air release valve and bottom of manhole flat top has been added to the air release valve detail (*Appendix A, A5.3*).
45. Quick connection on lift stations has been modified to shown the connection point in the valve pit rising above the surface of the concrete flat top (*Appendix A, A7.1*).
46. The quick connection detail has been changed to show a flanged end with ball and lever manufactured by Bauer (*Appendix A, A7.9 and A7.10*).
47. The revision date has been added (*Appendix B, Revision Summaries*).
48. Definition 27 was added for Trunk line a large sewer that collects wastewater from submains and conveys it to a treatment plant or pumping station (also called interceptor). In general, lines shall be considered trunk lines when the design capacity of the sewer is rated at 1200 GPM and the sewer is 15 inches and larger. (*Section 3, Definitions and Terms, 3.01, B. 27.*)
49. Lift station easement length is changed to 40 feet for up to a 40 ft deep wet well. (*Section 5, General Design Standards, 5.04, A.*).
50. Laterals are to be terminated at the R/W or easement line and shall not be connected to sewer trunk lines. (*Section 12, Construction of Sanitary Sewer Service Laterals, 12B.02, A.*).

SEE ATTACHED

APPENDIX B CONTINUED

<u>New Figure No.</u>	<u>Old Figure No.</u>	<u>Title</u>
A1.1	5-1	Standard Sanitary Manhole Detail
A1.2	5-1A	Exterior Joint Collar Detail
A1.3	5-2	Sanitary Drop Manhole Detail
A1.4	5-3	Sanitary Manhole Installed over Existing Sewer (Only with Special Approval from Utility)
A1.5	5-4	Typical Existing Manhole Entry Detail
A1.6	5-6	Sanitary Sewer Manhole Frame and Cover
A1.7	5-7	Waterproof Sanitary Manhole Frame and Bolted Lid
A2.1	5-8	Service Connection for Shallow Sewers (Alt #1 and Alt #2)
A2.2	5-9	Industrial Sewer Service Connection
A2.3	5-9A	Lateral Connection into Existing Sewer
A2.4	5-9C	Typical Grease Trap
A2.5	New	Typical Oil/Water Separator
A2.6	5-8A	Lamphole Frame and Cleanouts
A3.1	5-10	First Class Pipe Laying Method for Rigid Conduits (RCP & DI)
A3.2	5-11	First Class Pipe Laying Method for Flexible Conduits (PVC, CMP, RPVC, ABS, and HDPE)
A3.3	5-12	PVC Force Main Pipe Trench Detail
A4.1	5-12A	Surface Restoration Detail
A4.2	5-12B	Sidewalk Restoration Detail
A5.1	5-13	Thrust Blocking Details for Pressure Main
A5.2	5-12C	Force Main Marking Detail
A5.3	5-12D	Air Release Valve
A5.4	5-5A	Standard External Force Main Drop into Sanitary Manhole
A5.5	5-5	Standard Internal Force Main Drop into Sanitary Manhole (Only with Special Approval from Utility)
A6.1	5-14	Railroad Pipe Crossing Detail
A6.2	5-15	State Highway Boring/Casing Detail
A6.3	5-15A	Stream Crossing Detail
A7.1	5-17	Typical Lift Station Section
A7.2	5-16	Typical Pressure Gage Installation Layout
A7.3	5-17A	Lift Station Control Building Section
A7.4	5-17B	Lift Station Control Building Elevation
A7.5	5-17C	Lift Station Control Building Plan
A7.6	5-17D	Typical Pump Station Service Pole for Pump Station Services
A7.7	5-17E	Typical Pump Station Power Distribution Diagram
A7.8	5-17F	Typical Pump Station Electrical and Pump Control Mounting Detail
A7.9	5-17G	Bypass Pump Bauer Connection – Wet Well
A7.10	5-17H	Bypass Pump Bauer Connection – Valve Pit
A7.11	5-9B	Standard Metering Manhole

APPENDIX B COUNTINUED

A8.1	5-18	Traffic Control
A8.2	5-19	Traffic Control Sign Details
A8.3	5-20	Traffic Control Sign Details
A8.4	5-21	Traffic Control Sign Standard Details
A8.5	5-22	Traffic Control Device Legend and General Notes
A8.6	5-23	Traffic Control Device Locations
A8.7	5-24	Traffic Control Device Locations
A8.8	5-25	Traffic Control Barricade Details
A8.9	5-26	Traffic Control Barricade Type I and II Details
A8.10	5-27	Traffic Control Barricade Type III-B Details
A8.11	5-28	Traffic Control Cone/Drum/Tubular Marker Details
A8.12	5-29	Traffic Control Concrete Barrier General Notes
A8.13	5-30	Traffic Control Concrete Barrier Details